The Heating and Ventilating Magazine

A Monthly Journal of Engineering Progress

SEPTEMBER, 1926

The Place of Building Insulation in the Conservation Program

Greater Fuel Savings Through Tight Construction—a Keynote for the Heating Industry

IT is characteristic of American industry to be constantly striving for improvement, and this spirit has been in evidence in the heating industry, as well as in other phases of our national development. Heating plants, radiators and their supplementary apparatus and equipment are manifestly on a much higher plane of excellence to-day than were they or their equivalents twenty-five years ago.

Obviously, 101% efficiency is unattainable, now or ever. 100% is the mark at which all shooting must be done, although it stands to reason that no piece of mechanical equipment will ever reach perfection in its efficiency. Livened, however, by the inevitable spirit of competition that is the life and backbone of any real industry, builders of heating boilers are to-day so close together in their striving for efficiency, that they are literally stepping on each other's heels. An interesting, amusing and almost tragic example of this occurred recently when in reporting some tests of oil-burning equipment. the editorial department of THE HEATING AND VENTILATING MAGAZINE, or the printer, or the printer's devil was responsible for the reversal of captions under two curves showing boiler efficiencies attained with two different oil burners. The mistake necessitated quite a little explaining and the amusing part of it was that the criss-crossing of titles had reference to only one test and the difference in efficiencies shown by the two burners was less than 1%.

Here, then, we have the meat of a story that should cause a deal of thinking on the part of the American home-owner and business man and should bring about one of the most important developments in the possibility of the conservation of energy that has yet entered our national consciousness.

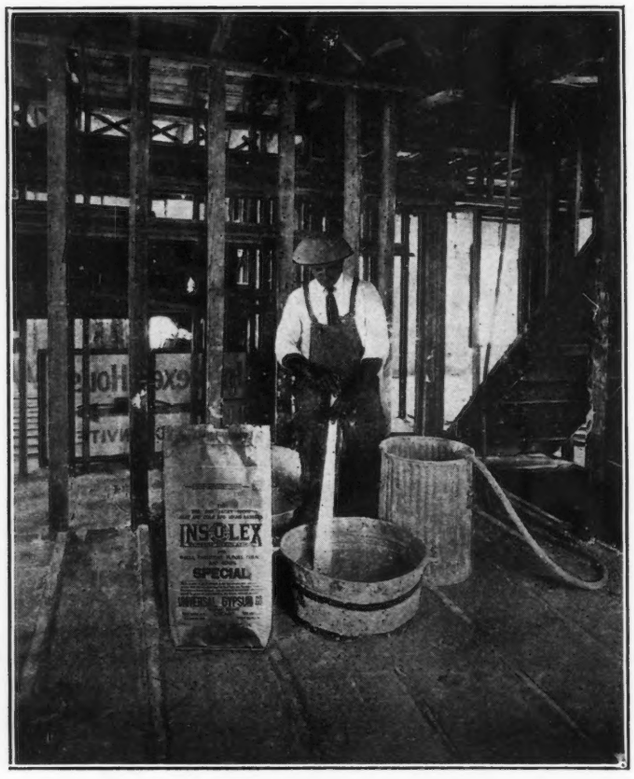
SAVING AT THE SPIGOT AND WASTING AT THE BUNGHOLE

Picture, if you will, rival manufacturers of oil burners or boilers "scrapping" over a possible supremacy of 1%. Let us assume that a boiler and the burner that showed 1% superior efficiency is sold to you for your home. You congratulate yourself on the fact that you have secured a heating plant of the highest obtainable efficiency. Then, if you are an average home-owner, you proceed to buy and burn almost as much fuel as is necessary to maintain a comfortable heat in your home throughout the winter and you thereby waste 100% more fuel than is necessary.

Surely, this is a serious situation and yet, it obtains almost universally throughout the country to-day.

"But," you say, " you speak very glibly of 50% possible saving in the heating of my home, when I have just expended considerable thought and energy in securing a heating plant that may be 1% or 2% better than another."

The answer lies in a development that is far from being new and that bids fair to follow almost paral-



Preparing Insulex for Pouring

lel with the path of the birth and childhood of the domestic oil-burner industry.

PROBLEM IS TO RETAIN HEAT

Speaking crudely, we develop heat in our heating plant to replace that lost, in one way or another, from our homes. For years we have been doing that without paying much attention either to the manner in which the heat is lost or to the rate at which it is dissipated. We merely furnish the fuel necessary to make up the ever-present deficiency.

But with fuel costs ever mounting, we have at last awakened to the fact that, while there may be differences in efficiency of 2% or 3% in the plant required to *produce* heat, it is entirely possible that there may be differences of 50% or more in the efficiency of RETAINING that heat, once it is produced.

So, the question of building insulation is coming to the fore with rapidly-increasing strides and regardless of any partisan feeling, there is but one answer—insulate.

INSULATION USED ORIGINALLY TO KEEP OUT HEAT.

In the early days, insulation was used principally to keep out heat. Probably the first buildings insulated were those for the storage of ice or for cold storage, where it was desired to maintain the building at a lower temperature than that of the outside atmosphere. We are now beginning to realize that the utilization of this principle may mean cutting in two of the fuel bills for our individual homes.

There are many American homes to-day that are partially insulated, but very few in which the insulation is carried to its logical extreme. Demonstration houses, too, have been built, usually by those interested in the manufacture of insulating materials, and these have served their purpose of stimulating interest in building insulation.

THE ASHENHURST CASE

Unquestionably, one of the most complete and convincing demonstrations of the value of house insulation was furnished during the past season by the home of H. S. Ashenhurst, in Chicago, data on which have been published in THE HEATING AND VENTILATING MAGAZINE for November, 1925, and April, 1926.

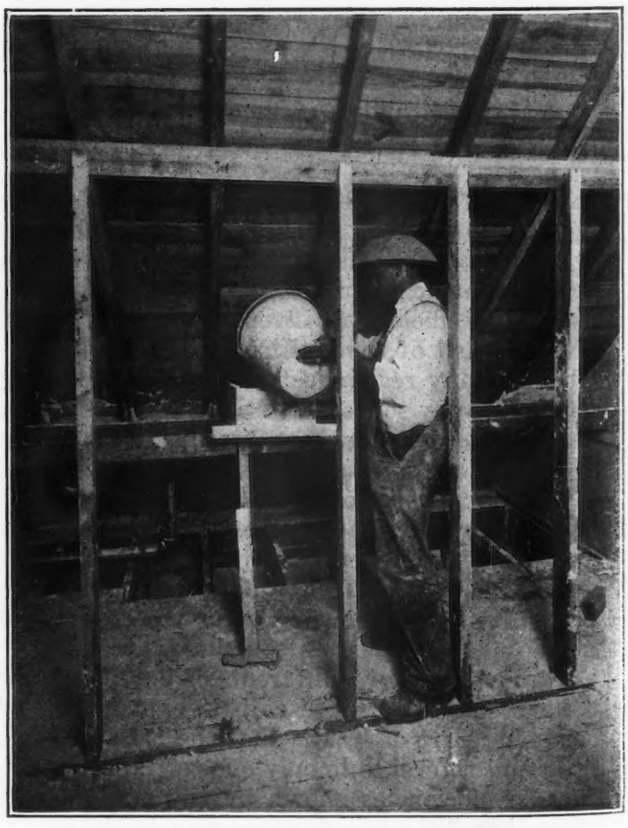
The outstanding feature of this test was the thoroughness and completeness with which it was carried out from its very inception. The house must have fairly bristled with recording and indicating instruments, from which Mr. Ashenhurst secured data that were most complete and irrefutable.

Setting forth his ideas on the subject of building insulation for THE HEATING AND VENTILATING MAGAZINE, Mr. Ashenhurst says:

"Let us assume that the well-built house is as airtight as it is possible to make it.

"The factors influencing heat leakage remain: first, the air change absolutely necessary for ventilation purposes; second, the unavoidable leakage through the window glass; third, the heat loss through the walls and roof.

"Heat loss due to the first factor cannot be limited without detriment to health. The second factor, likewise, remains a necessary imperfection—



Method of Pouring Insulex Under Roof

unless someone invents a glass which is non-conductive of heat.

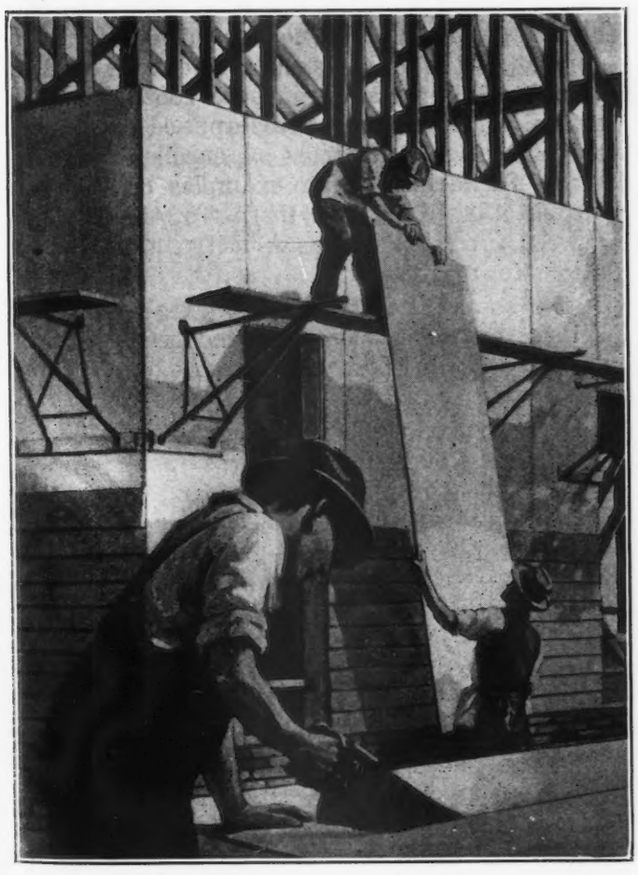
"The third factor then, the walls and ceilings, constituting as they do the greatest surface through which leakage can occur, is the one logical point of attack for him who would conserve heat and thereby save fuel.

"For the past seven or eight years much of my time has been devoted to observing the results in fuel saving when thorough insulation has been applied. One of the most striking of my early experiences in this field was the insulation of a hot water tank in the basement of an apartment house in which I then lived. Before the tank was insulated, it required a ton of hard coal every two months to keep the water hot. After it was insulated with 2 in. of Insulex, it required a ton of the same kind of coal only once every four months. There was a saving of 50% in fuel costs through a simple little installation of insulation which I did myself.

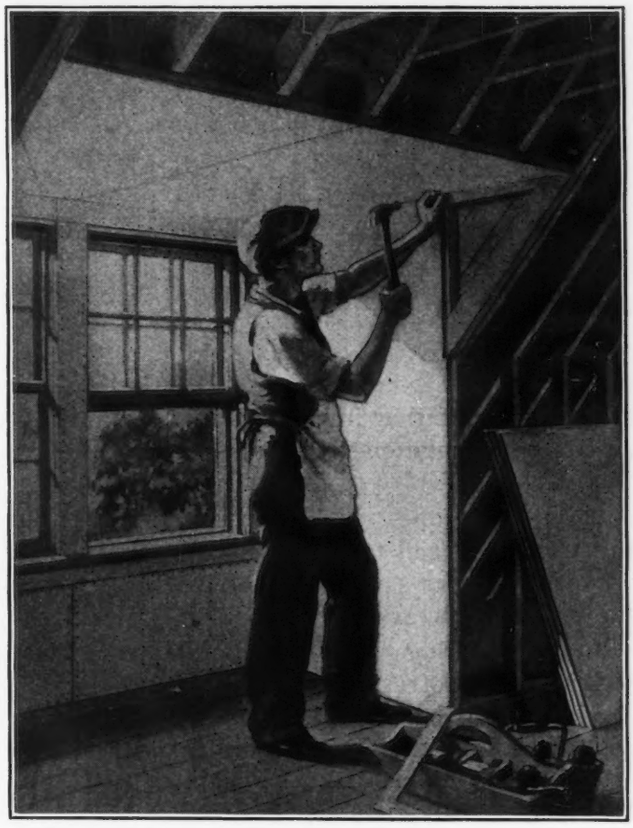
"It was at this time that I began to experiment with the fuel-saving effects of the thorough insulation of the side walls and ceilings of homes. As the number of houses insulated was at first very small, it was possible to follow up each individual case and find out what results had been obtained.

A COMPARISON OF TWO IOWA HOUSES

"In one case in an Iowa town two houses were built side by side, with the same dimensions and same specifications except that one of them had side walls and ceiling filled with Insulex—3½ in. in the walls and 4 in. in the ceiling. At the end of the heating season, the owner of the insulated house had used just half as much fuel as his neighbor. Both had used the same kind of fuel and consequently the owner of the insulated house had saved 50% of his heating bill. Furthermore, the owner of the insulated home reported that all of the rooms were comfortable in the coldest weather while his neighbor, with twice the cost for fuel, was unable to heat some of his rooms in cold weather.



Applying Celotex as Sheathing



Celotex Is Also Applied Indoors and Offers a Good Surface for Plastering

UPSTAIRS COLD ROOMS MADE COMFORTABLE

"Another interesting example of the results of insulation concerns a farmer in Wisconsin, whose wife and baby had suffered a great deal during the cold winters. He was unable to heat the upstairs rooms of his home and they were virtually uninhabitable in cold weather. He also had a great deal of trouble with his water pipes, which froze frequently. Four inches of insulation were poured in the upstairs ceiling at the beginning of one winter. That winter the house was warm all night, with the fire banked, and the pipes did not freeze once. In addition to this comfort, which he had not heretofore enjoyed, the owner of the house reported that his fuel bill was running approximately one-third less than it had previously.

"In Toronto, Can., a workman insulated the ceiling of his home, paying for the material on the installment plan. At the end of the season he announced that his saving in fuel cost that winter had paid for installing the insulation.

HOW INSULATION CUT GAS BILLS

In a Colorado city, the ceilings of a number of houses where gas had been used as fuel for several years were insulated. In a report on the results of this work after the season's heating, the gas company stated that in a number of instances the cost of the insulation was paid for in one season's fuel saving.

"Similar instances could be reported by the hundred-fold. In each case substantial savings in fuel were reported as a result of the insulation of side walls or ceilings, or both.

"In my own home in Chicago I have had a very striking demonstration of the value of thorough insulation during the past winter. This house, which has been mentioned before in THE HEATING AND VENTILATING MAGAZINE, was insulated by filling the side wall studs and the roof rafters to the full thickness with Insulex. An estimate was made by the People's Gas Company of Chicago, as to the cost of heating the house during the normal season. Actual gas bills showed one-half this estimated cost!

"In this case, recording thermometers were installed outside and in so that there can be no question that the house was comfortably heated throughout the season.

"During the winter of 1925-26 the People's Gas Company and the Universal Gypsum & Lime Company collaborated on the insulation with Insulex of the ceilings of some bungalows in Chicago. All of these buildings showed a great saving in fuel over former years, some of the reductions running as high as $100 on a former bill of $300.

HEAT LOSS DATA FOR A TYPICAL HOME

"These instances are only a few of many which might be cited, but they show that it is possible to effect a great fuel saving by the proper insulation of the side walls and ceilings of homes. Furthermore, it is a saving which could be effected in no other way to such a degree and it is a permanent economy which remains in effect as long as the building lasts in which it is installed.

In order to show what the actual saving in B.T.U. amounts to in insulated walls and ceilings, the following table of heating constants, prepared by the testing department of the Armour Institute of Technology, is appended:

HEAT LOSS CONSTANTS FOR BUILDING MATERIALS UNINSULATED AND INSULATED WITH INSULEX

FRAME CONSTRUCTION

SIDE WALL	UNINSULATED	INSULATED By Filling Stud Space with No. 12 INSULEX	
		Lath and Plaster	Gypsolite Plaster Board and Plaster
Clapboard, stud, lath and plaster	0 345	0.082	0.079
Clapboard, paper, sheathing, stud, lath and plaster	0.263	0 076	0.073
Brick veneer, paper, sheathing, lath and plaster	0.251	0.075	0.073
Cement stucco, paper, sheathing, lath and plaster	0.255	0.075	0.073

MASONRY CONSTRUCTION

SIDE WALL	UNINSULATED		INSULATED By Using 2-In. Furring Strips and Filling Space with No. 12 INSULEX	
	Plastered Direct on Wall	With 2" Furring Strips	Lath and Plaster	Gypsolite Plaster Board and Plaster
Brick wall				
Plastered 8 in.	0.379	0.272	0.111	0.105
12 in.	0.296	0.228	0.103	0.098
16 in.	0 243	0.196	0.096	0.091
Terra-cotta wall, Stucco exterior, Plastered inside				
8 in.	0.291	0.224	0.102	0.096
12 in.	0 225	0.183	0.093	0.088
16 in.	0.184	0.155	0.085	0.081

CEILING CONSTRUCTION

	UNINSULATED	INSULATED Filling Space Between Joists 4 In with No. 12 INSULEX	
		Lath and Plaster	Gypsolite Plaster Board and Plaster
Ceiling joists, Lath and plaster	0.692	0.082	0.079

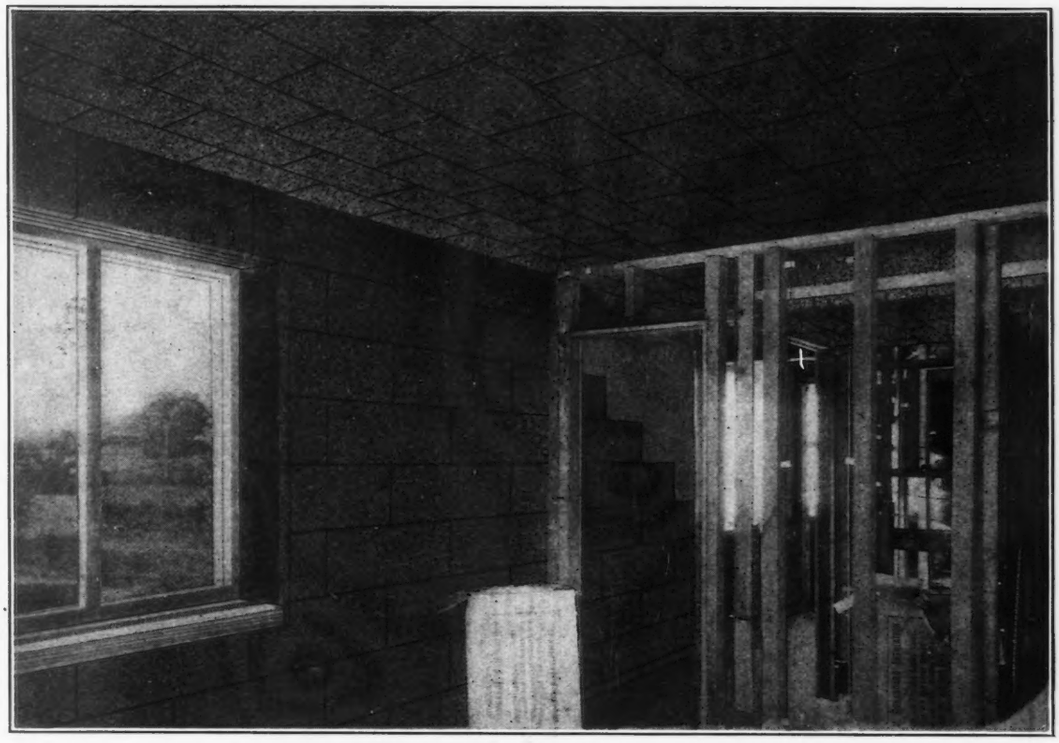
CORK AS AN INSULATOR

Cork has long been known as an insulating material, its earliest use being loose in the granular form. A logical step was the production of blocks or sheets made up of granular cork with a suitable binder. In rectangular blocks, about 2 ft. long with a thickness of 1½ in., this corkboard forms a readily applied and effective insulation for side walls of buildings, while for application of roofs, it is used in a 2-in. thickness. It can be applied over or between studdings and forms an excellent base for plaster. Some interesting examples of fuel conservation effected through the use of this material have been furnished by the Armstrong Cork & Insulation Co. of Pittsburgh.

In the cases cited, the houses are heated with gas, these examples being selected because of the facility of securing exact comparative data through the gas meter readings.

A house in Philadelphia, having a net volume of approximately 60,000 cu. ft., was insulated with 1½-in. corkboard applied on wall and second-floor ceiling. The house was of characteristic Philadelphia masonry construction, with corkboard set in Portland cement mortar. Manufactured gas was used for heating, cooking and service water. The meter readings for the approximate 30-days period, ending on the date shown, gave the monthly gas consumption as follows:

For Period Ending	Gas Consumption, Cu. ft.
December 5, 1925	18,600
January 4, 1926	142,500
February 3, 1926	124,200
March 5, 1926	128,700
April 5, 1926	110,200
May 4, 1926	60,700



Interior of Building Lined with Corkboard

June 3, 1926	30,700
July 6, 1926	18,100
Total	633,700

Estimated monthly consumption for cooking and hot water is 12,000 cu. ft., which leaves a net total for heating of 537,700 cu. ft. This represents a saving of approximately 25% over the fuel which would have been used without insulation.

In another home in Pittsburgh, Pa., of approximately 23,000 cu. ft. capacity, 2-in. corkboard was applied on side walls and on the under-side of the roof. Fuel used was natural gas (approximately 1000 B.T.U. per cubic foot).

For Period of	Gas Consumption, Cu. ft.
Sept. 15-Oct. 15, 1925	10,000
Oct. 15-Nov. 18	34,000
Nov. 18-Dec. 18	30,000
Dec. 18-Jan. 19	44,000
Jan. 19-Feb. 17	41,000
Feb. 17-Mar. 17	40,000
Mar. 17-Apr. 15	26,000
Apr. 15-May 18	17,000
May 18-June 16	9,000
Total	251,000

How Corkboard is Applied to Walls

Applying Cabot Insulating Quilt to Roof of House
(Sides of Buildings are Also to Be Covered With This Insulation)

A conservative estimate of the gas required for hot water, cooking, and garage heat will average 5000 cu. ft. per month through the year so that the net gas used for heating amounts to 206,000 cu. ft. By actual comparison with uninsulated duplicate houses in the neighborhood, this represents approximately 35% less fuel than would be required by the same house if it were not insulated.

The third citation is of a home in Chicago. Fuel, city gas, or approximately 450 B.T.U. per 1000 cu. ft. Gas used during the season of 1925-26 for heating only, 481,200 cu. ft. This represented a saving of approximately 20% over the fuel used in the preceding season, taking full account of the difference in temperature conditions. The insulation was applied on the roof rafters during the summer of 1925; the walls were not insulated.

THE USE OF INSULATING QUILT

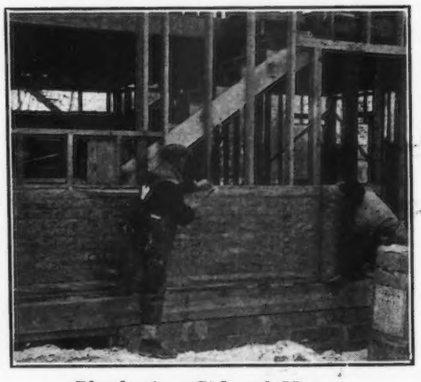
Yet another form of insulation material manufactured by Samuel Cabot, Inc., Boston, Mass., and known as Cabot double-ply quilt, has had an enviable record as a house-insulating material.

In a house in Philadelphia, occupied by H. T. Carkeek, at 1904 Sansom St.. which was equipped with Cabot insulating quilt, covering the entire framework, including all the roofs, the owner deducted about 10% in the amount of radiation. In a letter to the company, he states that after one winter's experience, he believes that this could have been increased to at least 15%.

In confirmation of the results secured by protecting his house against heat loss, he writes that during February, workmen from the central heating plant came to remove his meter with the explanation that it was not properly registering. Permission to do so was refused because of the owner's absence from the city. Upon his return, it was demonstrated that the meter was registering properly and that the low registering was due to the insulation. The same meter is still in the house.

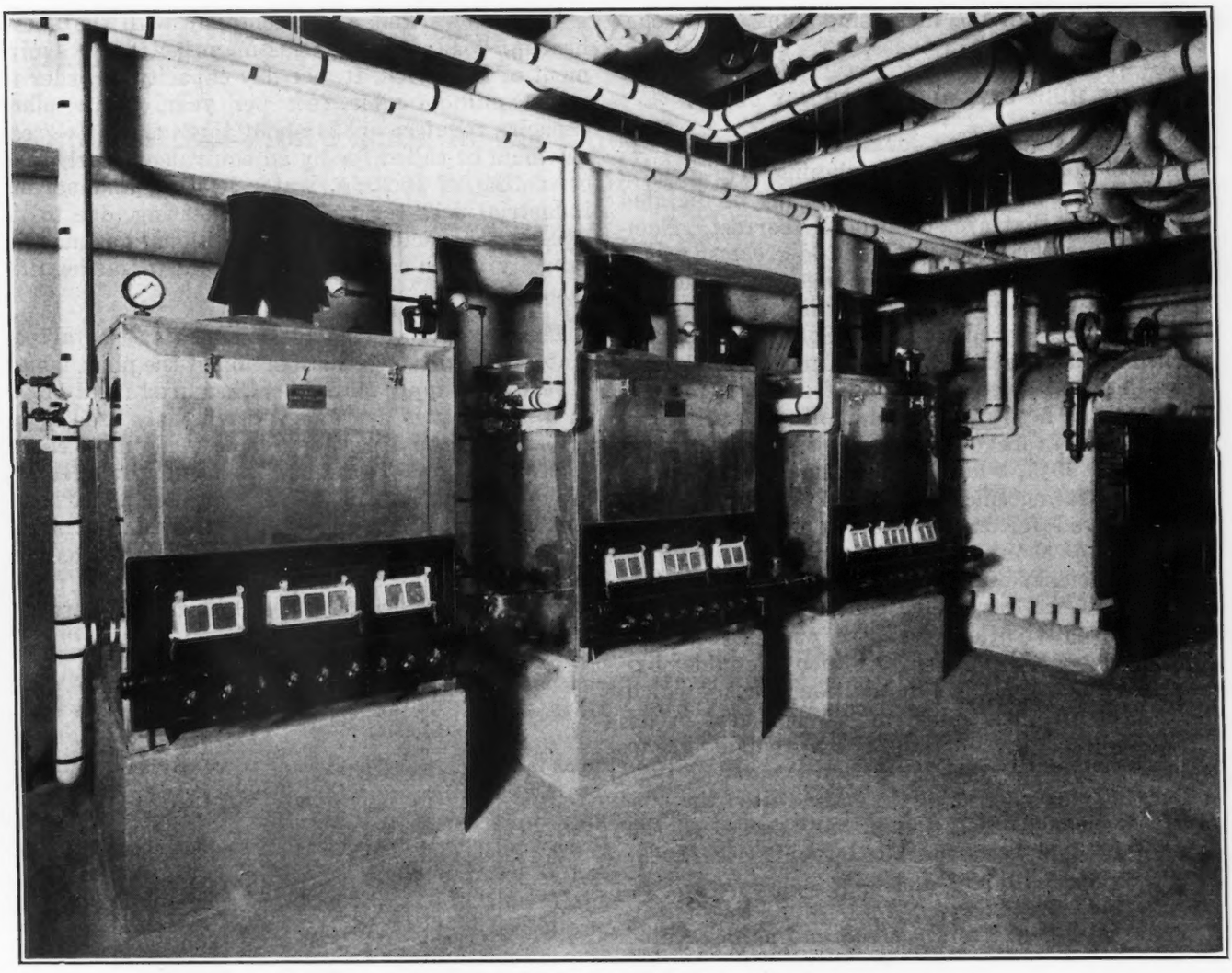
TESTIMONY FROM A COLD CLIMATE

An equally impressive experience is reported from Halifax, N. S., where a roof of a church, St. Thomas Aquinas, was covered with the same material. In describing the effect of the heat losses, the owner of the building writes that when built the same amount of radiation was put in the building as the heating engineers usually install.



Blanketing Side of House with Insulating Quilt

"We have removed four radiators already," he states, "for we never could use them. We have retained two which are never used, merely as a margin of safety, although we have not used them in the very severe weather of this winter."



Gas May Even Be an Economical Fuel for an Office Building

(These boilers are raised on concrete pedestals to make the water level the same as that of the coal boilers.)

Factors Promoting the Use of Gas for House Heating

High Over-all Efficiency Justifies Apparent High Cost of Fuel. Rates Being Developed on Basis of "Readiness to Serve"

By N. T. Sellman

Engineer of Utilization, Consolidated Gas Company of New York.

TO-DAY house heating is accomplished with every fuel known to man; local conditions, such as availability and price, are the major factors which determine the fuel used. In really no important instance can it be said that any particular fuel has a monopoly of the situation. In the last few years there has been a remarkable change from the use of solid fuels to liquid and gaseous fuels. This change was brought about by a desire for greater convenience, comfort and cleanliness. Strikes and fluctuating prices of coal have also caused the public to think "house heating" with a consequent increasing interest in oil and gas.

Gas is strictly a city and town fuel. Oil, because of its high heating value per pound or per cubic foot, is admirably suited for portable applications, such as vessels and railroads. Solid fuels, when not gasified, are only properly utilized in large, well-operated power plants. Coke, a by-product of gas making, is a clean fuel that will become more

available through the increasing number of coke-oven plants coming into use.

THE HIGH OVER-ALL EFFICIENCY OF GAS

The present changing conditions in the domestic fuel situation are only the beginning of a general readjustment which will most logically be dictated by principles that are scientifically correct. Fuel-utilization methods which make the greatest use of our natural resources, which eliminate waste and, at the same time, make for better living conditions, will eventually predominate. Solid fuels, when burned in a domestic heating furnace or boiler, have, under average conditions, from 50% to 60% of their total heat made available for useful work. Oil shows an average thermal application for house heating of 60%, while manufactured gas usually produces heating efficiencies of 85% to 90%. The methods used for manufacturing gas yield plant efficiencies of about 80%, so, therefore, we have an over-all efficiency of 68% to 72% based on the heating value of the raw fuel (coal or oil). When gas is made by distillation processes, such as coal gas or coke-oven gas, there are also valuable by-products made available, in addition to coke, which are useful to other industries. When coal or oil is burned in the home these by-products go to waste.

By gasifying coal or oil we have raised the efficiency from 60% to 72% and have decreased the amount of fuel used for heating purposes 20%. We have also eliminated smoke, ashes and fuel-storage bins or tanks. Gas is sold, "F.O.B. the boiler" and billed after received and used. Automatic temperature control completes the story, so that the modern gas boiler gives a service that is almost an infinite advance in the art of house heating over the use of coal, and a decided step in advance of the burning of oil.

THE REASON FOR THE "DEMAND CHARGE"

People generally are beginning to recognize the advantages of gas as a fuel and have, in many towns and cities, established a demand even where gas may be selling on a straight domestic rate. Gas-heating installations are now common in communities where coal would only cost one-third as much or oil one-half as much.

Many gas companies have established special heating rates; generally, this is a two-part rate and consists of:—

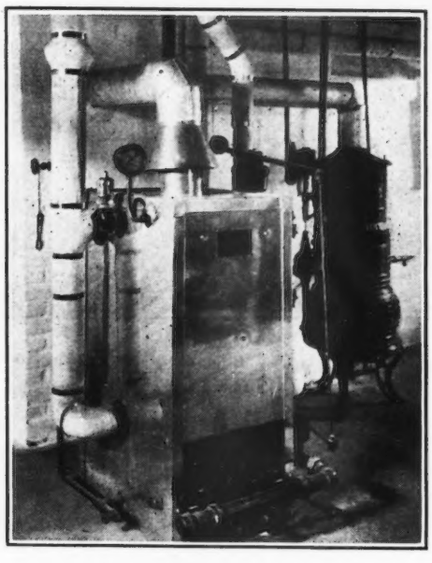
1. A charge in proportion to the hourly gas demand.
2. A charge for the quantity of gas used.

The demand charge is necessary, due to the nature of the house-heating load. This can be clearly understood if we analyze approximately how a million cu. ft. of gas would be used for heating purposes in a location such as New York.

1. Annual sale = 1,000,000 cu. ft.
2. Maximum month (January) = 210,000 cu. ft.
3. Maximum day = 13,000 cu. ft.
4. Maximum hour (burner demand) 800 cu. ft.

This shows that a gas company with the above heating load requires gas-manufacturing equipment of 13,000 cu. ft. per day capacity in order to sell 1 million cubic feet per year. This plant capacity requirement is about three times as great as would be called for by an equivalent yearly load consisting of cooking, water heating and normal industrial uses for gas. Thus heating, due to its seasonal character, calls for additional gas-making capacity which can only be charged to gas-heating sales.

The demand charge is in effect a "rental" or "interest" charge on that portion of the plant which is ready to supply all the heat required for a house on a zero-degree day and which is only used to its full capacity on a zero-degree day. In most cases, where this type of rate has been put into effect, it has developed that the average rate for house heating will be from 20% to 40% less than straight small-consumption domestic rates, but not as low as large-volume industrial business. In other words, a profitable house-heating rate lies between the small-consumption domestic rates and the large-volume industrial rates.



Gas May be Used for Heating the Smallest Home

It can clearly be seen that a million cubic feet sales per year, secured through an industrial load that is distributed evenly over the 12 months, is much more desirable and, consequently, can enjoy a lower rate. When the demand rate is used, the charge is usually distributed evenly over the entire year or over the six or eight heating months. The charge for the quantity of gas used is decidedly lower than ordinary rates as the demand has already absorbed the fixed charge on the plant.

Many communities that have special heating rates have reduced the cost of gas heating so that it compares favorably with other fuels. The progress of the past five years indicates an ever-

(Continued on Page 85)

The Crux of the Ventilation Problem

Control the Vital Factor in the Consideration of Either Mechanical or Natural Methods of Fresh Air Supply

By J. E. Rush, M. D.

(Abstracted from the paper entitled "A Rational Basis for Ventilation, presented by Dr. Rush at the semi-annual meeting of the American Society of Heating and Ventilating Engineers, in Lexington, Ky., May 28, 1926.)

IT would seem that the object of ventilation of occupied rooms is to maintain the air in a condition in which it approximates that of outdoor air on a pleasant, temperate day of summer. In the addition of air or its removal from rooms it should be our attempt not to create a draft. To define the common term draft is apparently a rather difficult thing, but perhaps a working definition may be a current of air which removes one part of the *aerial blanket* in such a way that the heat is removed from the body more rapidly than it is generated. If this took place over the whole surface of the body we would not consider it a draft because of the fact that the heat regulating mechanism of the body would then come into operation and would cause a readjustment of the circulation.

While we realize that the evil effects of placing many persons in a confined space does not come from a diminution in oxygen or an increase in carbon dioxide, nor from the chemical vitiation of the air, nor the presence of a volatile organic poison, there is considerable evidence to show that increase in temperature and humidity and a lack of movement of the air are the important factors. Increase in the surrounding temperature makes it more difficult for the body to get rid of its heat by radiation and conduction, and increase in humidity increases the difficulty of cooling effects by the evaporation of perspiration, and the result is an elevation of bodily temperature, a decreased vaso-motor tone, the gorging of the skin with blood, and the symptoms that have already been described. In order to avoid the discomforting and debilitating effects on the body due to lack of ventilation it would seem that we should consider ourselves well within our rights to attempt to control all the factors which we have a right to expect would obtain in an air supply, which would give us optimum conditions.

* * * *

The problem of ventilation is a complex one. There is a need for the removal of odors and excessive dust; there should be an attempt to control droplet infection by methods of ventilation so far as that may be possible; carbon dioxide while in itself not poisonous, is perhaps not an extremely desirable material in high concentration. That individuals may survive in experimental chambers for short periods of time under decreased oxygen and increased carbon dioxide and increased humidity is true, but that these are extremely desirable conditions and that they are more suitable for the living organisms than conditions simulating those of outdoor air, no one is foolish enough to believe. That the control of temperature, humidity and air movement may control all of the other factors entering into the problem of ventilation is a fairly complex one with a good many interacting factors to be considered goes without saying. Take into consideration the lack of constancy in temperature, humidity, dust, etc., in the out door air and it will be seen that the getting of air into a building and having it meet certain desirable specifications is a good deal of a problem. That all of the factors concerned in ventilation are not very satisfactorily answered at the present time must be apparent from the foregoing statements.

There are two general methods for ventilation, the one, the so-called *natural* system, is usually accomplished by opening the window. This is probably of great value under ordinary conditions in houses, but the system is usually inadequate for schoolhouses or meeting halls, where great numbers of people congregate. The artificial systems of ventilation are those which are usually installed in connection with heating systems. This is the type that is usually found in large buildings and schools, meeting halls, churches and the like and the ventilation is accomplished either by the plenum system, in which the air is forced into the rooms, or by the vacuum system, in which the air is exhausted from them, or by a combination of the two methods. Various modifications of these systems have been instituted from time to time in which the air may be washed, or screened, or humidified, or some of it may be recirculated. Most of these systems are based on a unit which attempts to supply 30 cu. ft. per minute per person.

In comparing the two methods, namely, *open window* ventilation and *artificial* ventilation, it will be noted that the former is by no means a controlled process, while the latter, if properly constructed and properly operated, should be able to meet any type of condition that is likely to be placed upon it. The former is haphazard or is dependent on chance, while the latter is under control. No provision can be made in natural ventilation for the conditioning of the air unless it is the one factor of increasing its temperature, and we have noted that there are many factors in the problem.

(Continued on Page 85)

Modernizing Obsolete Heating Plants

Surveys of Remodeled Installations Give Definite Figures of Savings in Fuel, Decreased Operating Expenses and Increased Income from Property

ALMOST every engineer and manufacturer in the heating and ventilating field finds, in the normal course of business, example after example of heating installations that are still in daily operation, although, by comparison with attainable present-day standards, they are quite obsolete, and of such low over-all efficiency that a thorough-going modernization would prove highly profitable to the owners of the property.

While hundreds of such installations are revamped each year, the modernization is usually postponed until the old installation is completely worn out. In other words, heating installations are generally replaced only when they become non-operable, *instead of as soon as they become obsolete.*

The public has been educated to discard automobiles as soon as they become obsolete and long before they are worn out. Similarly, industry has learned that it pays to discard obsolete machine tools by comparing productivity of the old with the new.

Many examples of the saving to be made through modernizing obsolete plants come to light each year. Usually, however, the proofs are rather sketchy and, in many cases, colored by the enthusiasm of interested parties.

The following data, furnished by Warren Webster and Company is free of these objections. It was obtained for them by the A. C. Nielsen Company, of Chicago, a firm of consulting engineers specializing in investigation work, which was retained by the Webster Company and instructed to survey several modernized installations. The reports of these surveys, in each case, are certified to, both by the Nielsen Company and by a responsible representative of the property owner. These reports, therefore, may be accepted as free from the enthusiasm that might emanate from an interested party.

The reports of these surveys are made in such concise form that they are here reprinted practically verbatim, and they form an interesting contribution to the literature of conservation in its broad sense. It is interesting, in the case of the two hotels and of the textile plant, to note that the fuel saving resulting from the change was not considered as important as the improvement in heating service. In the case of the shirt factory, the saving was effected entirely through the increased production of the employees on account of the better heating conditions.

A study of these reports is well worth while as indicating parallel improvements that may be made in almost any plant in the country that is not strictly up-to-date and in many of those that are so considered.

The reports follow:

Conversion of Gravity Heating Plant in Factory of Signal Shirt Company Racine, Wis.

THE Signal Shirt Company of Racine operates two nearly identical plants in the manufacture of outing flannel shirts, railroad men's shirts and overalls. Any difference in methods of operation or nature of equipment in the two plants is very easily subject to close comparison.

The large amount of hand work involved demands an even and easily-regulated temperature in work-rooms if maximum production is to be obtained. The plant at 18th and Flett Streets had operated for four years without loss of production during severe weather. At the Mound Avenue plant there was a loss of at least 5% of normal production when the outside temperature was 10° F. The former plant was heated by a vacuum system. The latter was heated by a gravity-return system.

While the vacuum system was giving satisfaction, the gravity-return system proved to be entirely inadequate. Regardless of how much coal was fired, it was impossible to maintain a comfortable temperature with low outside temperature.

OLD PLANT CONVERTED TO VACUUM SYSTEM

The local heating contractor was called in, with the result that recommendations were made for changing the system over to a vacuum return system. The installation was made in the latter part of 1923.

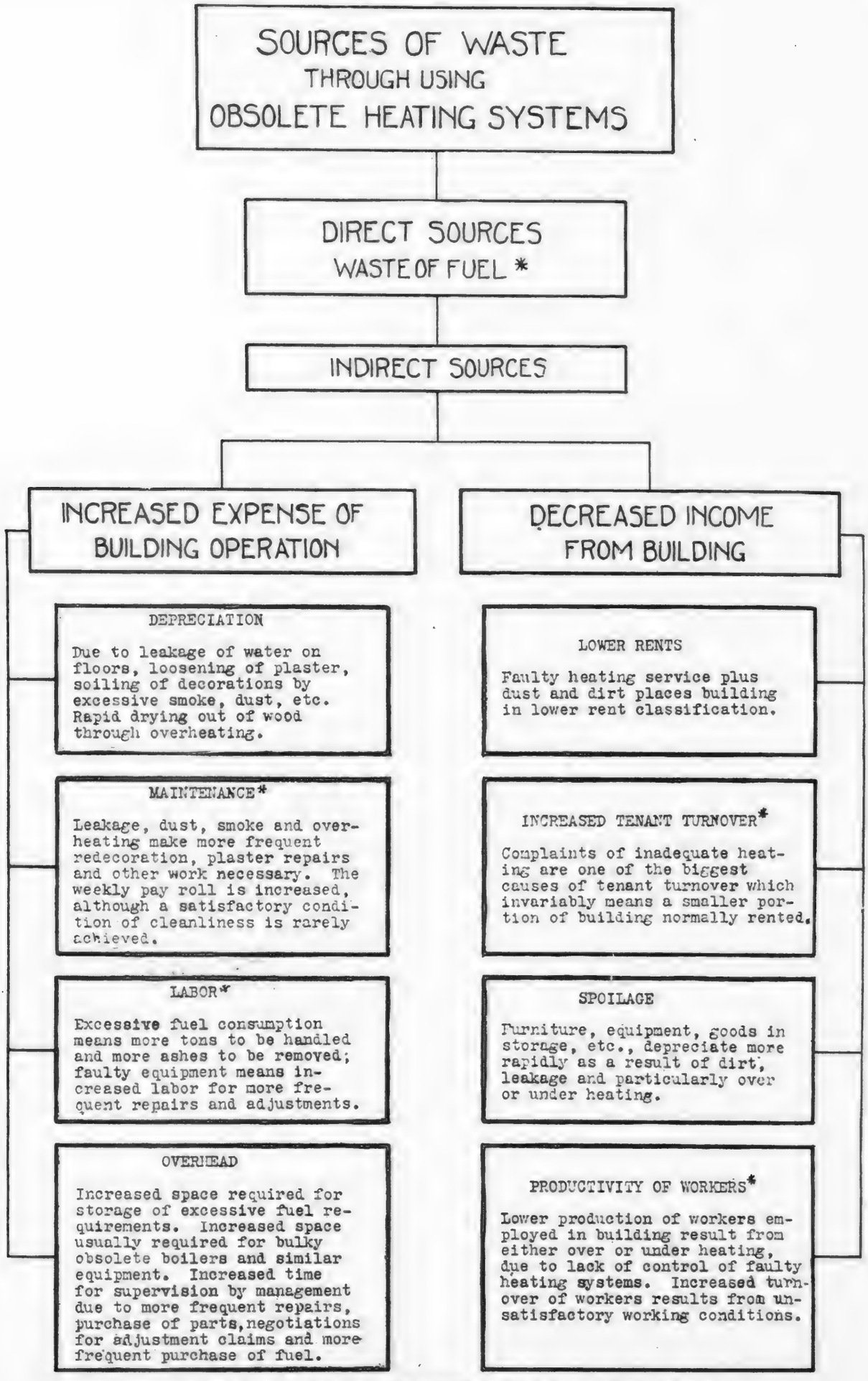
The new system was placed in operation in January, 1924, and has given excellent results. Regardless of weather conditions, the engineer opens the fires at 6 o'clock and is able to maintain a uniform temperature of 70° to 75° F. throughout the plant until closing hours, when the fires are banked.

COST OF MODERNIZING GRAVITY SYSTEM

A brief tabulation describing the plant and its old and new heating equipment follows:

DESCRIPTION OF PLANT

Material, brick, wood partitions, wood floors.
Size, two stories and basement, 80 ft. x 360 ft.
Floors heated, two.
Exposure, four sides and cold roof.


SOURCES OF WASTE
THROUGH USING
OBSOLETE HEATING SYSTEMS
DIRECT SOURCES
WASTE OF FUEL *
INDIRECT SOURCES
INCREASED EXPENSE OF BUILDING OPERATION
DECREASED INCOME FROM BUILDING
DEPRECIATION
Due to leakage of water on floors, loosening of plaster, soiling of decorations by excessive smoke, dust, etc. Rapid drying out of wood through overheating.
MAINTENANCE*
Leakage, dust, smoke and overheating make more frequent redecoration, plaster repairs and other work necessary. The weekly pay roll is increased, although a satisfactory condition of cleanliness is rarely achieved.
LABOR*
Excessive fuel consumption means more tons to be handled and more ashes to be removed; faulty equipment means increased labor for more frequent repairs and adjustments.
OVERHEAD
Increased space required for storage of excessive fuel requirements. Increased space usually required for bulky obsolete boilers and similar equipment. Increased time for supervision by management due to more frequent repairs, purchase of parts, negotiations for adjustment claims and more frequent purchase of fuel.
LOWER RENTS
Faulty heating service plus dust and dirt places building in lower rent classification.
INCREASED TENANT TURNOVER*
Complaints of inadequate heating are one of the biggest causes of tenant turnover which invariably means a smaller portion of building normally rented.
SPOILAGE
Furniture, equipment, goods in storage, etc., depreciate more rapidly as a result of dirt, leakage and particularly over or under heating.
PRODUCTIVITY OF WORKERS*
Lower production of workers employed in building result from either over or under heating, due to lack of control of faulty heating systems. Increased turnover of workers results from unsatisfactory working conditions.

***An asterisk has been placed on each source of waste which has been definitely eliminated by the modernization described in the accompanying four surveys**

Roof, truss type, full length monitor, tar and gravel covered.
Windows (high infiltration).
184— 4 ft. x 9 ft.
16—2½ ft. x 9 ft.
4— 6 ft. x 9 ft.
144— 4 ft. x 5 ft. (in monitor)

ORIGINAL HEATING LAYOUT

Type, steam, L.P. gravity return, 5 lbs. pressure.
Radiation:
First floor—11 open wall coils, 60 ft. long, 10-1 in. pipe.
2 encl. wall coils, 60 ft. long, 10-1 in. pipe.
Second floor—11 open wall coils, 60 ft. long, 10-1 in. pipe.
1 open wall coil, 40 ft. long, 10-1 in. pipe.
2 open vert. rad. 30 in. high, 16 sec.
4 tube, 1-in. pipe.
Boilers, three cast-iron sectional.
Radiator traps, none.
Radiator valves, Crane and Standard.

REVAMPED HEATING LAYOUT

Type, Webster vacuum system.
Radiation (same as above except coils added in monitor).
Additional, three open wall coils, 60 ft. long, each containing 3 lines of 1 in. pipe.
Boilers, same.
Radiator traps, Webster return traps.
Radiator valves, same as before.
Pump, electric vacuum, driven by a 1-hp. motor.

SUMMARY

Total cubic contents, 1,031,040 cu. ft.
Number of open radiators, 25.
Number of enclosed radiators, 2.
Total radiation, 5,614 sq. ft.
Total window area, 6,842 sq. ft.
Total window perimeter, 8,700 ft.

SUCCESS OF NEW SYSTEM

Fuel costs have been about the same with both systems—the point is that previously it was impossible to heat the building, no matter how much coal was burned, and even heating is accomplished with the new system. Fuel and operating costs run $1.61 per 1,000 cu. ft. of interior per year of 7½ months' operation, as shown in the accompanying table. The annual fixed charges on the added equipment are $301.23.

Production has not fallen off in the coldest weather experienced since the new installation. If the old system had been operated during the year 1924 there would have been 124 hours (computed from U. S. weather reports showing temperatures in Racine of 10° F. or lower) when production would have fallen off 5%. This may be evaluated as 5% of the wages of 250 employees earning an average of 60c an hour for 124 hours, or $930.00. Deducting fixed charges, the saving for 1924 was $628.77.

No overhead has been charged on the productive labor lost. Furthermore, a loss of production was noticeable when the outdoor temperature was much above 10° F., reaching 5% at that level. Also, sickness resulting from cold work-rooms has a continuing effect upon production, whether the worker is forced to remain at home or not. He does not at once regain his full capacity. Nor has any account been taken of the better spirit toward the management engendered by continuously comfortable working conditions.

SIGNAL SHIRT COMPANY

Fuel and Operating Costs

Fuel cost in 1924	$1,200.00	
Cost per 1,000 cu. ft. interior		$ 1.21
Operating costs:		
1 engineer, half time 8 x $85.00 x ½	$340.00	
Power costs (vacuum pump) 266 kw. @ 6-1/3c	16.80	
Repair and maintenance allowance— (none to date) revamped equipment	40.00	
	$ 396.80	
Operating cost per 1,000 cu. ft. interior		.40
Fuel and operating costs per 1,000 cu. ft. per year		$ 1.61

Fixed Charges on Installation

Depreciation, $2,477.40 ÷ 15	$165.16
*Average interest at 6%, 16/15 x $2,477.40 x 0.06/2	79.27
Power costs	16.80
Repair and maintenance allowance	40.00
Annual fixed charges	$301.23

Savings Effected

5% x 124 hours x 250 employees x 60c	$930.00
Net saving effected, $930.00 — $301.23	$628.77

On this basis improvements will pay for themselves in about 4 years.

*Allowing for interest earned by depreciation reserve.

Conversion of Two-Pipe Gravity System in Endicott Hotel, New York

Hotel Endicott, New York

THE Endicott Hotel, in New York, was heated, until the fall of 1923, by a two-pipe gravity system which, at the time of installation, was satisfactory. But with the development of the art of heating, the system became out of date and the failure to maintain all rooms at a comfortable temperature was a serious handicap to the management.

The building is not an easy one to heat. It is an 8-story U-shaped structure of brick and stone,

fronting 200 ft. on Columbus Avenue and 160 ft. on 81st and 82nd streets, containing 480 guest rooms. One 250-hp. and two smaller boilers are located near the center of the building and all three were generally required in cold weather to maintain any degree of comfort in the more distant rooms. The total radiation in the building is about 30,000 sq. ft.; 22,000 sq. ft. of direct cast-iron radiation and 8,000 sq. ft. equivalent in the water heater.

In 1923, the chief engineer made an investigation to determine what changes would be necessary to modernize the plant and in the fall it was changed to a vacuum system of steam heating. Since its installation conditions have been surprisingly improved. Instead of using three boilers, the cold weather load is easily carried with the one large boiler. The farthest rooms are as well heated as those in the central portion.

The piping was revised where necessary. Webster Sylphon traps were installed on the return side of some radiators, while on others Webster Sylphon attachments were installed in the old valve bodies. The old radiator supply valves were retained. Two vacuum pumps, one a spare, were installed in the basement, each driven by a 5-hp. motor. These maintain a vacuum of from 4 in. to 5 in. in the return lines.

BETTER HEAT DISTRIBUTION AT LOWER PRESSURE

Steam is generated at 10 lbs. pressure and reduced to about 1 lb. for distribution through the mains. Formerly it was necessary to maintain a pressure of from 5 to 7 lbs. and the farthest rooms were not well heated, even at that pressure.

Under such conditions it was difficult to operate the boiler room efficiently, demands for more pressure resulting in careless firing.

With the old system, radiators frequently became water-logged, which invariably resulted in a call for service. This occurred when a supply valve was opened without also opening the return valve, and was both annoying to guests and a cause of water leaking from the radiators, with damage to decorations below.

Since the change guests have made no complaints of insufficient heat, even in the farthest rooms and no replacements of traps or other equipment have been required.

Regulation of heat is much more effective. A cold radiator is quickly brought to full heat on opening the supply valve—a condition which was far from true with the old system. There is far less noise from radiators and entire freedom from pounding. Water does not accumulate in the radiators under present conditions and does not leak out of the system.

While no detailed records of coal saving have been kept, it is believed that the average daily saving throughout the heating season, amounts to 0.4 ton, which is 5% of the previous consumption. At the prevailing coal price during the heating season of 1924-25, this is a daily saving of $1.80 and an annual saving of $432.00.

The saving in the cost of redecorating ceilings and walls, damaged by leaking radiators, is not possible to evaluate from the records but probably exceeds the saving in fuel. There is a still further saving in the cost of air valves, which were frequently replaced on the old system and are not used on the new.

The money saving is, however, of relatively small importance as compared with the increase in heating efficiency and comfort of guests. The goodwill of patrons is one of a hotel's greatest assets and was jeopardized so long as the old system was in use.

Conversion of 25-Year Old Two-Pipe Gravity-Return System in Department Store and Office Building

THE Malley Building in New Haven, Conn., is an 8-story brick-walled fire-proof steel structure with large window areas on all sides. The Edward Malley department store occupies all but the upper four and one-half floors, the rest being high-class office space.

The building was originally heated with a two-pipe gravity-return system, installed in 1900. Basement, first floor and part of the second and third floors are heated by a fan blast system with air washer, and the balance of the building by direct radiation. The total equivalent direct radiation connected is 7,350 sq. ft. Radiators are about 200 in number and of varying types, one- and two-column and with both 20-in. and 23-in. sections.

The system was inadequate. It was necessary to maintain 5 lbs. pressure and on cold days the upper offices could not be adequately heated. Heating was slow and control impossible. Tenants opened windows when an office became too hot, as the supply of heat could not be controlled readily.

One year ago the entire system was revised with marked improvement both in heating and in economy. A vacuum system of steam heating was employed.

Webster Sylphon Attachments were installed in the bodies of the old valves, without disturbing existing radiator connections. Some revision of risers was necessary.

The boiler plant consists of three horizontal-return tubular boilers designed for 150 lbs. pressure. They are operated at 75 lbs., which is reduced to 2 lbs. for heating. Steam is supplied to several other buildings. Fuel is a mixture of buckwheat anthracite and bituminous coal. Vacuum is maintained by two pumps driven by 2-hp. motors, one a reserve unit.

The system now operates successfully at 2 lbs. pressure and the eighth-floor offices are always warm. Furthermore, the radiators warm up within fifteen minutes; whereas, with the old system, it required an hour to heat up the system. Before, radiators were seldom shut off because they were not quickly responsive on opening. Tenants would open their windows rather than attempt control at the radiator. This was wasteful of steam. With

the new system, tenants make use of the radiator valves with consequent economy.

It is now possible to warm up the building on mild days and shut off steam for several hours. This was formerly impossible because of the length of time needed to warm up the cold radiation.

SAVINGS EFFECTED

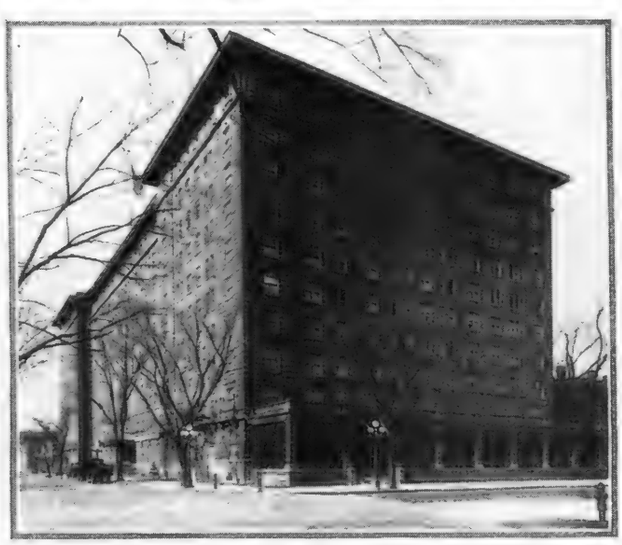
The new system has effected a decided economy, averaging 7,840 lbs. of steam, or 980 lbs. of coal per day during the heating season. This saving was effected last season when slightly more than the average amount of cold weather prevailed. On the basis of 150 days of heating and coal at $4.00 per ton, this amounts to $294.00, or $40.00 per 1,000 ft. of radiation.

But of far greater importance is the elimination of former troubles with the two-pipe gravity system. Tenants were constantly demanding service because radiators became air bound and could not be controlled. The new system permits closer control of each radiator and to date there has not been one instance of a radiator failing to function properly.

THE MALLEY BUILDING
Savings Effected By Changing Two-Pipe Gravity Heating System To Vacuum Heating System
7,350 Sq. Ft. Equivalent Direct Cast-Iron Radiation

Total saving of steam per average season of 150 days	1,176 M lbs. steam
Average saving per day, 1,176 M lbs ÷ 150 days	7,840 lbs. steam
Average saving of coal per day, 7,840 lbs. steam ÷ 8 lbs. steam per lb. of coal	980 lbs. coal
Annual saving, 0.49 tons coal @ $4.00 x 150 days	$294.00
Annual saving per M sq. ft. of radiation— $294.00 ÷ 7.35 M sq. ft. radiation	$ 40.00

Economies Effected by Remodeling Old-Type Vacuum Heating System in Minneapolis Hotel



Leamington Hotel, Minneapolis, Minn.

WHEN the Leamington Hotel was built in Minneapolis fifteen years ago, a two-pipe vacuum heating system was installed. The system was considered by heating specialists to represent the best practice.

Standards of heating efficiency have advanced materially, however, since 1910, both in economy of operation and in heating service. Operating as an apartment hotel and serving both permanent and transient guests, the management was ready to adopt any new development which would make for the greater comfort of guests, as a means of maintaining the best clientele.

In 1921, it was decided to modernize this system through the use of Webster Sylphon attachments. In October of that year the new attachments were installed on practically all radiators. As a result, sufficient coal was saved to justify the expenditure, and the effectiveness of the heating plant was greatly increased.

There are 950 radiators, with about 30,000 sq. ft. of radiation, mostly 2-col. 38-in., 9 and 10-section, set close to windows. Two 150-hp. boilers supply steam at 90-lbs. pressure which is reduced for heating to pressures ranging from atmospheric to 1½ lbs., depending upon weather conditions. The building is completely exposed on four sides. A temperature of from 70° to 75° F. is now maintained in every room.

The heating season is from the first of October to late in May and steam is supplied for 19 hours a day, under average conditions. Coal consumption during the average heating season is 1,600 tons, an average of 6.65 tons per day, with the present equipment.

NET ANNUAL SAVING OF $534.94

Tests made immediately after the system was modernized indicated a saving of ¾ ton of fuel for each 10 tons previously burned, a reduction in fuel cost of 7.5%.

Without the present equipment the coal consumption in an average season would be 1,730 tons as against an actual tonnage of 1,600. At the present price of $6.66 per ton, the saving amounts to $865.80.

The entire cost of the equipment, including installation, was $3,100.00. Assuming a life of 15 years for the equipment and an allowance of $25.00 a year for maintenance, the total expense chargeable to the equipment, including depreciation, average interest and maintenance, is $330.86 a year, leaving a net annual saving of $534.94. This is a net return on the investment of 17%.

Despite the high return, the money saving is considered unimportant, the better heating service now obtained being the major consideration, since the comfort of guests is essential to full occupancy of suites.

LEAMINGTON HOTEL

Coal costs and savings:			
Present average (tons per year)			1,600
Additional coal required without new equipment (tons per year) (1,600 ÷ 92.5%) — 1,600			130
Saving in coal cost: 130 tons @ $6.66			$865.80
Equipment costs:			
Depreciation on cost of new equipment and installation— $3,100.00 ÷ 15 years	$206.66		
*Average interest @ 6%— 16 x $3,100.00 x 0.06 / 2	99.20		
Annual maintenance allowance	25.00		330.86
Net Annual Saving			$534.94
Annual return on investment			17%

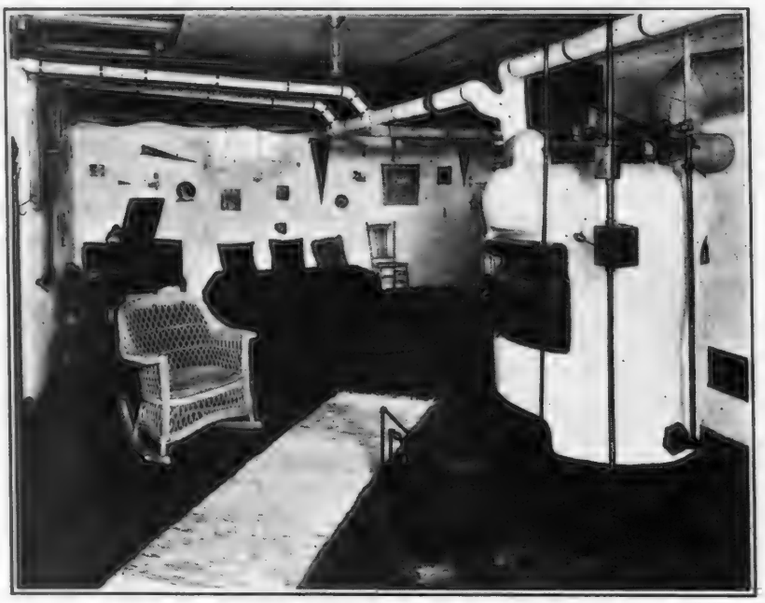
*Allowing for interest earned by depreciation reserve.

Where the Oil Burner Stands

Conservation from a New Angle—Developments of the Past Year Have Made Gas, Rather Than Coal, the Chief Rival of Oil

THE very material increase in the use of fluid fuels for the heating of homes that has marked the last two years has introduced new factors into the economic problem of American home owners.

The outburst of advertising, catalogs and high-pressure salesmanship that has marked the development of domestic oil burning during this period, and the sudden awakening of gas company officials to the possibilities of the house-heating load have come, following the laws of Nature, as the crest of a wave that has been a long time in the forming.



This Cellar in a New England Home Has Been Made Available for the Children's Use Through the Installation of an Oil Burner.

Oil burners were not new in the far West a decade ago. Ten years ago, there was a considerable house-heating load in the city of Baltimore and even district steam heating had been carried beyond the experimental stage.

Two or three years ago, those in the oil-burner industry looked upon coal as their major rival and there was every evidence, in the literature put out by the oil-burner manufacturers, that there would be a battle royal between the two.

To-day, it is apparent that the fight is to be between oil and gas, for the simple reason that these two fuels stand in a class by themselves, as compared with coal. With them, as a heating agent, must be reckoned district steam, easily superior to either in desirability, but obviously greatly limited in its sphere of possible use.

OIL AND COAL CANNOT BE EQUATED ON BASIS OF HEATING VALUES

In considering the heating of our homes. schools, churches, factories and other industrial buildings from the standpoint of conservation. one must recognize the fact that there are other forms of conservation than the mere saving or curtailing. in one way or another, of the use of our natural resources; in this case, the fuels—coal, oil and gas.

Two or three years ago, the oil-burner manufacturer was endeavoring to sell his equipment on a basis competitive with coal, as to fuel costs and efficiency of utilization. Catalogs were replete with statements such as "As is well known, 125 gal. of oil is equivalent to a ton of coal."

Such a statement, at best, does not mean a thing, as no one would think of comparing 30 horses with a 30-H.P. automobile, either truck or sedan. The 30 horses might easily represent an aggregate pulling power greater than the truck, yet it would be manifestly impossible for these 30 horses to move two or three tons of merchandise 250 or 300 miles in a day, and, regardless of the value of these animals as driving horses, it would be futile to consider them as the means for transporting a family from 300 to 400 miles in a single day.

By the same token, one cannot compare tons of coal with gallons of oil, for the simple reason that with one can be accomplished what is impossible of achievement with the other.

The error of this procedure has evidently been recognized, as few statements of this kind are found in the oil-burner catalog of to-day. Instead of telling a man that so many gallons of oil equal a ton of coal, in order to give the prospect an idea of his probable oil consumption, the agent to-day ascertains the amount of radiation in a building and, by means of the Iso-Oil-Consumption Chart, quickly tells the prospect, with a high degree of accuracy, how much oil fuel he will use during the coming season.

OIL AND GAS TO BE THE RIVAL FUELS

It will be seen, then, that coal is not in the same class as oil as a domestic fuel, because it is impossible with coal to secure equivalent performance. It is equally evident that gas and oil are to be the rival fuels because substantially the same results may be had with either fuel. Speaking broadly, there can be little question that gas is a more desirable fuel than oil for several reasons.

In the first place, the gas-fired plant will show, on the average, 10% to 15% higher over-all efficiency than the oil-fired plant, largely because the gas-fired boiler will absorb a higher percentage of the heat developed in its combustion chamber than will the present-day coal-type boiler converted to the use of oil. Furthermore, one must pay for his oil before it is used, frequently in lots sufficient for the better part of a season's supply; while, with gas, payment is made month by month after the fuel has been consumed. Even the most ardent advocate of oil burning must admit that the least noisy of the many grades of "noiseless" burners advertised to-day is not as quiet as the gas-fired equipment.

The fact that over 70 gas companies have recently announced house-heating rates should be a warning to the oil-burner manufacturers that they have a live and aggressive rival, unusually well organized locally, and certainly united into a homogeneous whole in the American Gas Association.

OIL BURNER SALES STARTED ON FALSE PREMISE

With this brief survey, let us consider what the oil-burner manufacturer may legitimately claim in regard to the economics of oil burning. Many of these claims may be used with equal force in an argument for the use of gas as a fuel.

The infant oil-burner industry has undoubtedly made a grave mistake in its wild spasm to "sell" the oil-burning idea to the American public on the basis that it is cheaper than coal.

Why should it be?

Would any sane man expect to buy a Rolls Royce for the price of a flivver?

The recent reaction in the oil-fuel market in some sections of the country, where the prices of oils have been increased 1c or 2c per gallon, has sent some of the oil-burner agents scurrying for cover and for new ammunition, and brought a caustic "I-told-you-so" from those interested in the sale of coal.

AVERAGE USER OF OIL FUEL WILLING TO PAY MUCH MORE FOR OIL THAN FOR COAL

The returns coming in from a questionnaire sent out, nationwide, by THE HEATING AND VENTILATING MAGAZINE have developed the interesting fact that those who have had oil burners for three years or more would be willing to pay from 50% to 200% in excess of the cost of coal for their oil fuel. The average is probably very close to 100%. These data completely knock in the head the necessity for selling-talk based on oil being cheaper than coal.

It doesn't have to be.

There must be, then, some overbalancing factor, aside from costs, in favor of oil that must be considered in an economic sense. The answer is that the man who is heating his home with oil is getting heat of a different quality, if you please, from that furnished by coal. And for this improved quality, the average man is willing to pay a double price. There is, then, conservation in some other form to justify this apparently uneconomical paradox.

WHAT IS THE ELIMINATION OF MR. OWNER'S TIME WORTH

A woman in the Middle West bought an oil burner to relieve her husband of the daily work at the furnace and the Saturday afternoon exercise with the sifter in the alley. This man is a high executive in a company known throughout the civilized world. He has slowly grown to his present position from a point where he could not afford to hire a man to take care of this furnace and ashes. For years, he has been able to pay any reasonable sum for a furnace man, but each year has found it more difficult to secure a trustworthy man for this menial work, involving comparatively free entrance into his home. Several disagreeable experiences have brought him back to the ashcan.

Now, for three years, he has had freedom from that sort of thing. The value of the hours and minutes per week he has spent in the care of his coal-fired furnace would pay, twice over, for the cost of oil fuel burned during the week, let alone the difference in cost between oil and coal. Consequently, from the standpoint of conservation, the value of this man's time saved would completely overbalance an excess cost of 100% for oil over coal, if such were the case. There are many thousands of such instances throughout the country where the conservation is in the form of a saving of human energy, rather than of money representing fuel cost.

Or, expressed in another way, there is hardly a home-owner in the country to-day who, being legitimately able to put in an oil burner, could not capitalize his time saved at an amount much greater than any possible discrepancy in fuel cost.

The foregoing must not be taken in any sense to be an admission that heating with oil does cost more than heating with coal. Like everything else, there is quite a range between the extremes, even with a given burner.

Speaking in very general terms, if a home requires 12 tons of coal or less per heating season, oil fuel should cost approximately the same, while for larger installations, there should be a saving in proportion to the amount of coal consumed per annum.

AN UNEXPLORED FIELD FOR CONSERVATION

Let us now look at the matter from another angle. Suppose you have built a two-story and basement home, 25 ft. square, at a cost of $10,000. If the rooms have 8-ft. ceilings, you will find that this building will cost you almost exactly $1.00 per cubic foot of contents. This, of course, does not include the basement volume because it is, in the vast majority of cases, not used for living purposes. Let us assume, now, you have a basement 8 ft. high, with reasonable window space and that you have installed an oil burner.

Based on what has actually been done in this respect, it is comparatively easy for you to utilize

an appreciable part of this volume for living purposes. As the volume of this basement is about 5000 cu. ft., you would have, if you could use one-third of this volume, 1700 cu. ft. available or, at the same unit cost, $1700 worth of house.

If your oil burner installation costs $850, it is obvious that you are securing twice this outlay in what is virtually an addition to your home. Surely, this is conservation in the broad sense.

An instance might be cited of a contractor in an eastern city, whose growing daughters took advantage of the installation of an oil burner in their home. Approximately one-half of the heretofore unused basement was converted into a very lovely recreation room, where they regularly entertain and dance.

Exception may be made to this citation on the ground that such a case is the exceptional one. That may be true, but it is exceptional simply because others have not taken advantage of the same opportunity and not because the opportunity is exceptional.

DIRT ELIMINATION IS CONSERVATION

Yet another form of conservation, very definite in visibility, but difficult to evaluate, comes from the cleanliness of the oil burner and in the elimination of dirt and ash dust, resulting when coal is the fuel.

Women, in houses heated with oil fuel, invariably refer to the noticeable difference in home cleanliness, and this is conservation in more than one form, because it represents a saving in human labor in the thousands of homes where servants are absent, as well as no mean saving in the cost of wallpaper, the cleaning of hangings and draperies and other items that go to make up the interior of the home.

Thus it will be seen that conservation in the use of fluid fuel is not essentially a matter of prime fuel cost, but is measured by the aggregate of several items all very tangible, but frequently difficult to reduce to money terms.

The coming of electric washing machines, refrigeration equipment and other similar devices, and the use of fluid and, therefore, automatically fed and controlled fuels, has materially decreased the amount of labor required to maintain the average home.

All too frequently this is a labor of love and carries with it no remuneration at wages dictated by unions, with time-and-a-half for overtime and double time on Sundays.

The very fact that the sales of such devices aggregate many millions of dollars per year is indicative of the average man's regard for the comfort and well-being of his home folks and of his desire to conserve, so far as may be possible, their energies, as well as his own pocketbook.

Factors Promoting the Use of Gas

(Continued from Page 76)

broadening interest in meeting the heating demand. Methods of gas manufacture, rates and appliances are developing progressively with the same objective.

Gas water boilers of several standard makes yield operating efficiencies of 90%; steam boilers, 85%; warm-air furnaces, 85%. Automatic operation includes not only room temperature, but every feature relating to the proper and safe burning of the gas. The latest models all include safety pilot control. This provides for automatically shutting off the burner supply in the event of the pilot light being extinguished. Steam boilers are equipped with an automatic low-water shut-off, thus preventing a boiler from being overheated.

Several recent installations of gas boilers in insulated houses have proven the value of insulation and the resultant operating cost has made gas become an economical fuel even on apparently unfavorable rates. Insulation as applied to an average frame house will reduce the amount of radiation required about 30%, with a proportional saving in gas consumption. The saving in radiation, boiler size and consumption is sufficient to pay, in a few years, for completely insulating all the exposed surface. The insulated house is cooler in summer, drier and less noisy than ordinary construction.

There are some cities that can now list the number of gas installations in the thousands; in other cities the gas companies are rapidly gaining experience and developing proficient heating engineers. The change in economic conditions that makes gas the logical fuel of the future will find the gas company ready with fuel, personnel, appliances and service.

The Crux of the Ventilation Problem

(Continued from Page 77)

The question merely resolves itself into whether or not we desire a certain type of air for our rooms or, perhaps more correctly, is a certain type of air more advantageous to health than another type? It will be apparent that if there are air conditions which might be termed *optimum* these cannot be obtained by any hapzard means, where people are crowded together, such as by simply opening the windows. If we find that it is desirable to have a certain type of air, and a certain amount of it, there is little question in anyone's mind but that if these conditions can be determined definitely and scientifically the type of air which is desired can be delivered by mechanical appliances.

We need *controlled* conditioned air, just as we have controlled conditioned milk or controlled conditioned water.

This is the twentieth lesson of
The Heating and Ventilating Magazine's

New Home-Study Course in Gravity Steam and Water Heating

Lesson No. 20

By Ara Marcus Daniels

WHILE straight two-pipe steam heating systems, as shown in the figures accompanying this lesson, are probably the exception, rather than the rule now-a-days, yet many such plants using two valves to a radiator are in use. It is, therefore, essential that the student have available ready data concerning such and be prepared to use same for inspection and report work.

Straight two-pipe steam heating systems may be installed having either a wet or dry return. Fig. S-5-1 shows a wet-return system installed in a two-story rectangular building, while Fig. S-5-2 shows a similar installation with dry return.

These two-pipe systems are used frequently in large buildings and in practically all work where indirect steam radiation is installed. The system can be readily adapted to mechanical vacuum systems. Two-pipe systems of this type, with either wet or dry returns, require that the return from each radiator be separately sealed.

In the wet-return system, Fig. S-5-1, this is accomplished by carrying the main return below the boiler water-line and connecting each return riser from a radiator into it. Water will stand in these return risers at a height slightly above the boiler water-line and thus seal them so that steam from the steam main cannot pass through the radiator, into the return riser and thence into the return main. With unsealed return risers or drips, steam might enter a drip or return from the radiator out-

*Copyright 1926, Ara Marcus Daniels.

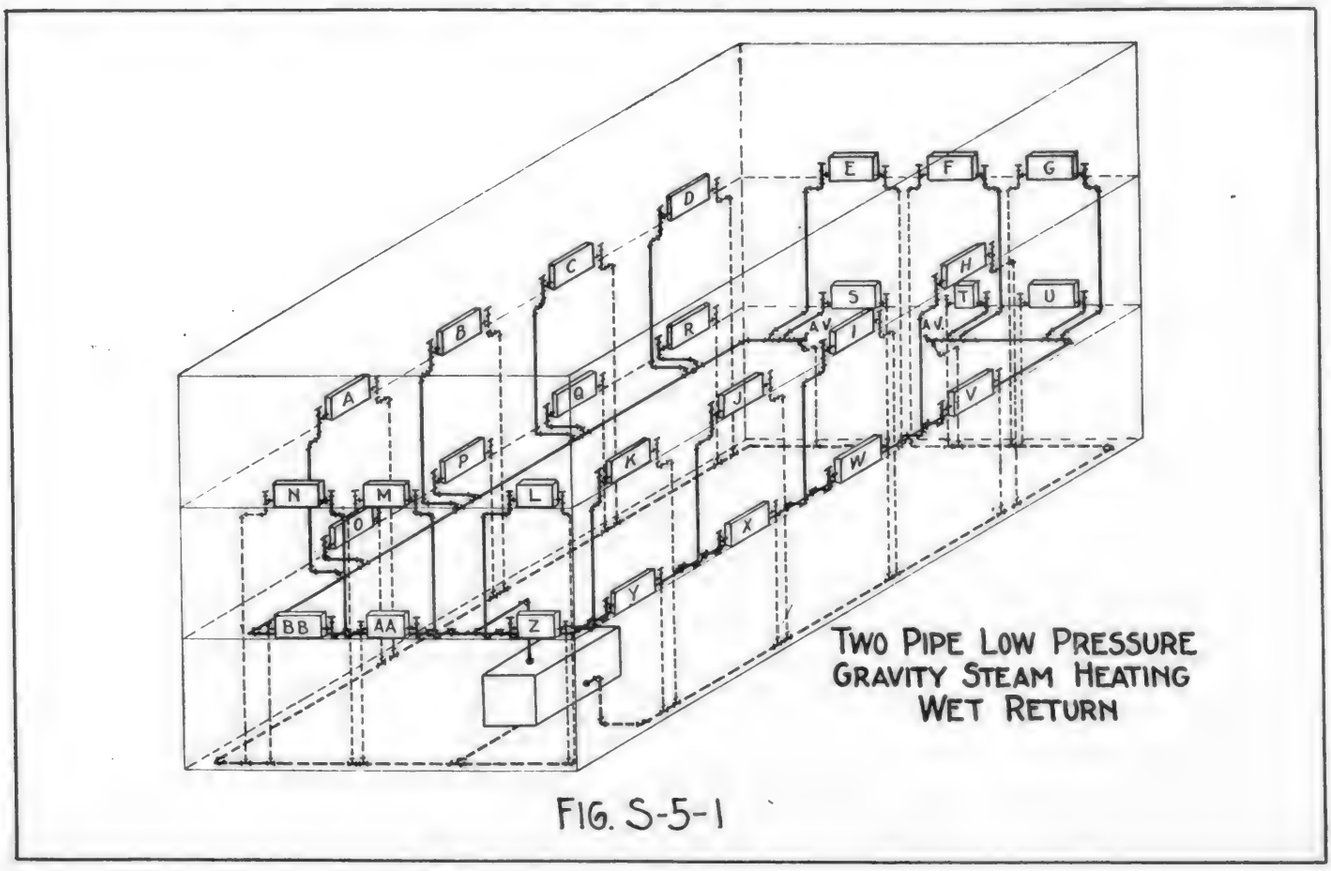


FIG. S-5-1

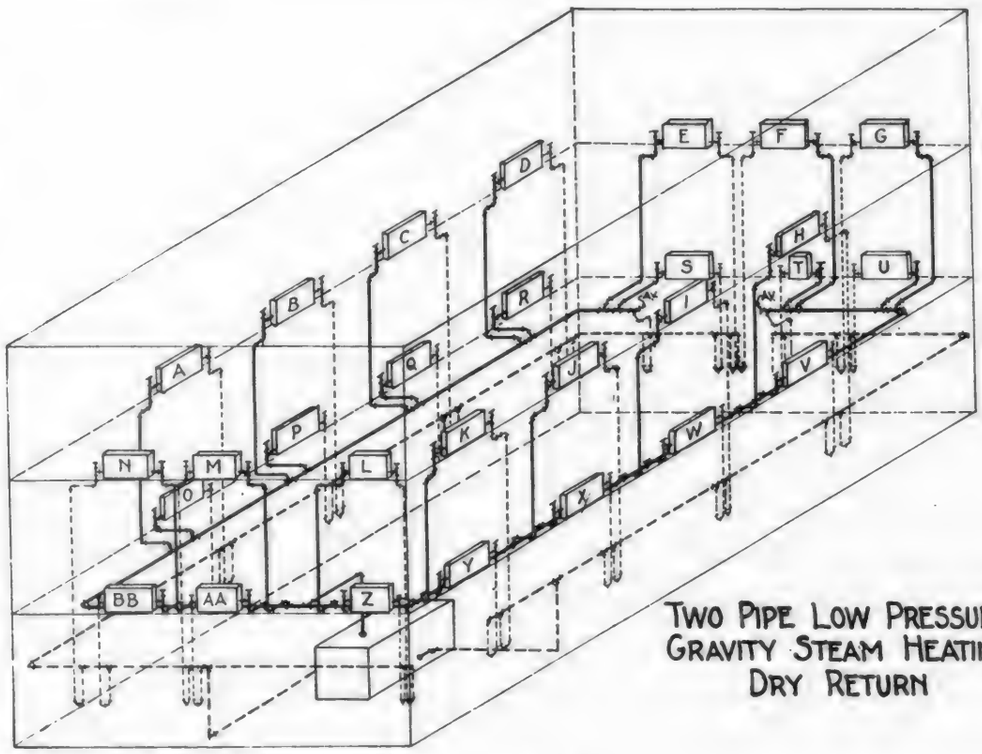


FIG. S-5-2

let end, with a resulting knocking or water-hammer, due to the counter currents of the steam and water of condensation. It should invariably be observed that any drip relief, return riser or connection from the steam to the return side of the system must be sealed. This may be accomplished by connecting below the boiler water-line, as explained, or by using a radiator trap or return trap properly placed in the connecting line.

In the two-pipe dry-return steam system, Fig. S-5-2, the piping is similar to that having a wet return except that drip loops are used to separately seal the return from radiators and drips before connecting into the dry return.

Two-pipe steam-heating systems differ from a one-pipe system in which the main is not dripped in that it may be reduced as rapidly as withdrawal of steam will permit.

SIZING PIPES BY QUANTITY OF RADIATING SURFACE

Similarly, as was explained in Lesson S-3 for one-pipe work, pipe sizes for two-pipe steam heating with either wet or dry returns may be determined from suitable tables. Such tables, numbered S-5-1 to S-5-6 are included herewith and were prepared on the same basis as Tables S-3-3 to S-3-8.

Fig. S-5-3 shows a first-floor radiator as it might be connected for two-pipe work, using a wet return. Knowing the radiating surface of this radiator, there are three lengths of pipe between the

TABLE S-5-1
TWO PIPE STEAM
RADIATOR VALVE SIZES

RADIATION SQ. FT.	SUPPLY INS.	RETURN INS.
1 TO 20	3/4	3/4
21 TO 40	1	3/4
41 TO 80	1 1/4	1
81 TO 160	1 1/2	1 1/4
161 TO 320	2	1 1/2

TABLE S-5-2
TWO PIPE STEAM
ARMS-SMALL BRANCHES
UP FEED RISERS

RADIATION SQ. FT.	PIPE SIZE INS.	
	1 TO 5 FT.	5 TO 10 FT.
1 TO 24	1	1 1/4
25 TO 60	1 1/4	1 1/2
61 TO 100	1 1/2	2
101 TO 200	2	2

TABLE S-5-3
TWO PIPE STEAM
LARGE BRANCHES
NOT DRIPPED
STEAM MAIN TO RISER
UP FEED RISER
WATER AND STEAM FLOW IN OPPOSITE DIRECTION

RADIATION SQ. FT.	PIPE SIZE INS
1 - 40	1
41 - 75	1 1/4
76 - 100	1 1/2
101 - 170	2
171 - 220	2 1/2
221 - 340	3
341 - 460	3 1/2
461 - 600	4

TABLE S-5-4
TWO PIPE STEAM
STEAM MAINS
NOT OVER 100 FT.
LARGE BRANCHES
DRIPPED
WATER AND STEAM FLOW IN SAME DIRECTION

RADIATION SQ. FT.	PIPE SIZE INS
1 - 40	1
41 - 75	1 1/4
76 - 150	1 1/2
151 - 300	2
301 - 500	2 1/2
501 - 900	3
901 - 1500	3 1/2
1501 - 2000	4
2001 - 3600	5
3601 - 6000	6

TABLE S-5-5
TWO PIPE STEAM
DRIPS FOR RISERS

SIZE STEAM RISER	DRIP SIZE TO RETURN	
	WET	DRY
1	3/4	3/4
1 1/4	3/4	3/4
1 1/2	3/4	1
2	1	1
2 1/2	1	1 1/4
3	1	1 1/4
3 1/2	1 1/4	1 1/2
4	1 1/4	1 1/2

TABLE S-5-6
TWO PIPE STEAM
RETURN MAINS

RADIATION SQ. FT.	WET	DRY NOT OVER 400' GRADE AT LEAST 1"-30'
1 - 180	-	3/4
181 - 420	1	1
421 - 800	1	1 1/4
801 - 900	1 1/4	1 1/4
901 - 1500	1 1/4	1 1/2
1501 - 1800	1 1/4	2
1801 - 3000	1 1/2	2
3001 - 4900	2	2 1/2
4901 - 6000	2	3
6001 - 9000	2 1/2	3
9001 - 10000	2 1/2	3 1/2
10001 - 13000	3	3 1/2
13001 - 18000	3	4
18001 - 26000	3 1/2	-
26001 - 37000	4	-

main and the radiator to be sized. Tables S-5-1 and S-5-2 should be used. If the radiator contains 70 sq. ft. of surface, the valve size A on the supply side by Table S-5-1 should be 1¼ in.; the stub B should be the same size as the valve A, 1¼ in. for first-floor radiators; the branch C, by Table S-5-2, should be 1½ in. if not longer than 5 ft., or 2 in.

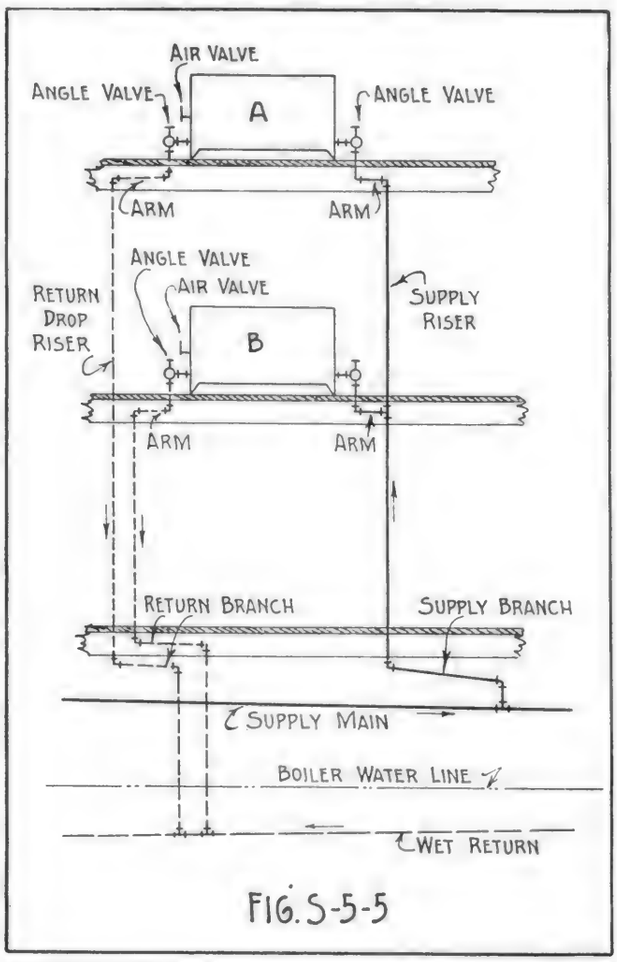


FIG. S-5-5

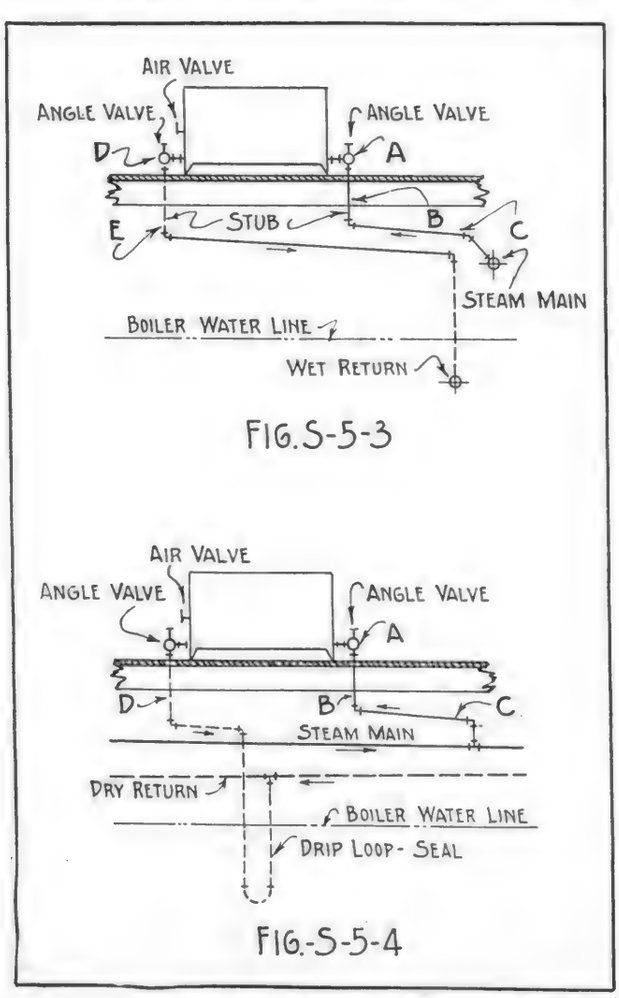


FIG. S-5-3

FIG. S-5-4

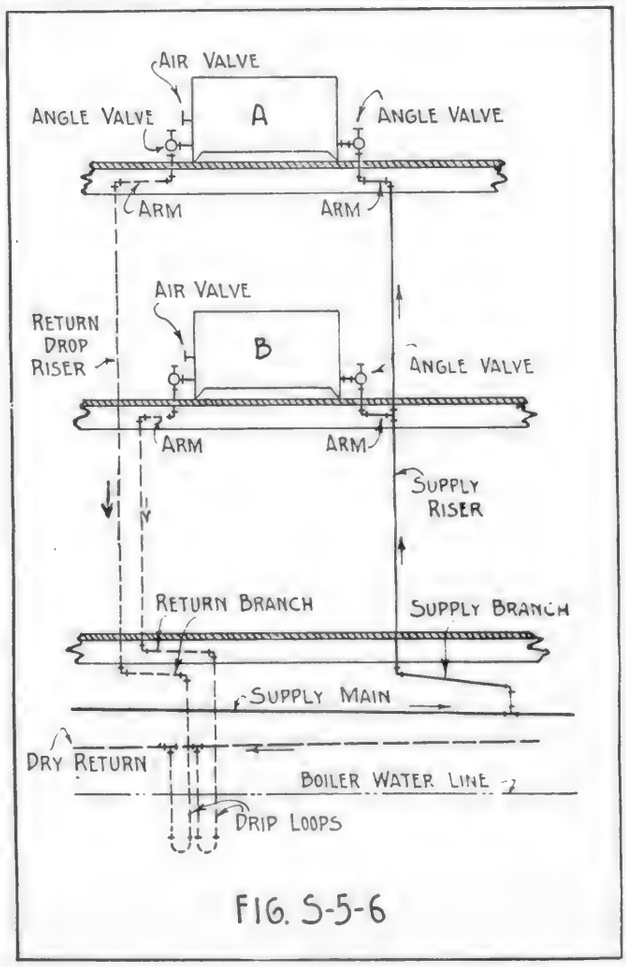


FIG. S-5-6

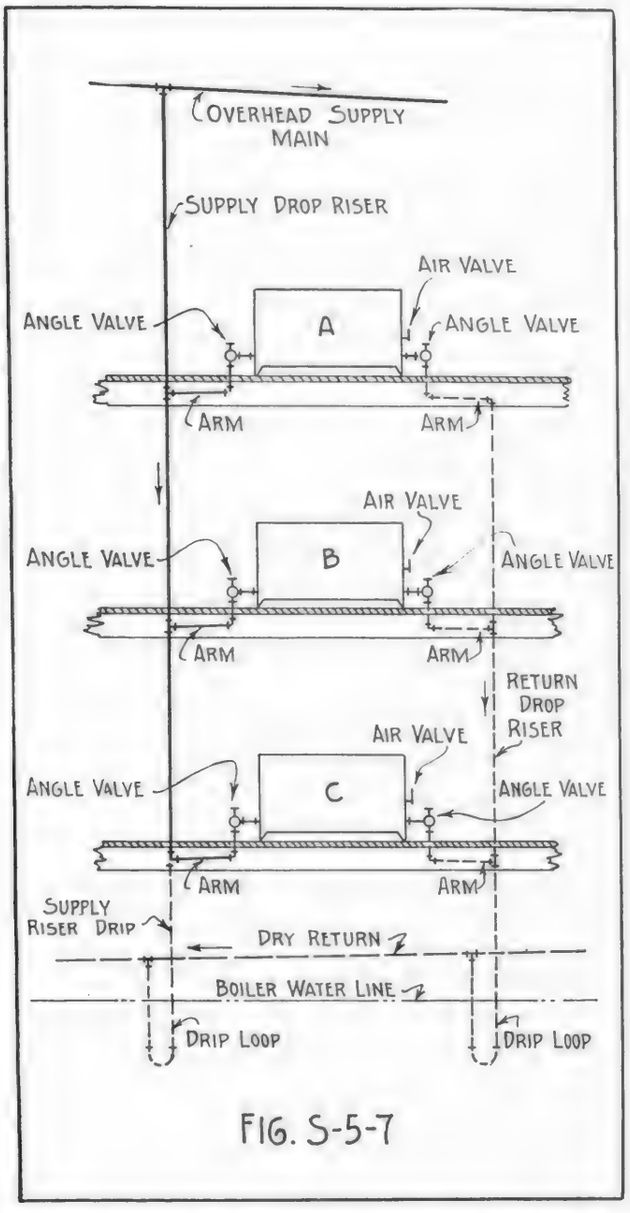


FIG. S-5-7

if that length is exceeded. On the return side, valve D, by Table S-5-1, should be 1 in.; the stub E, 1 in.; and arm F, 1 in.

Work Problem S-5-1.

Fig. S-5-4 shows a first-floor radiator with return sealed to the dry-return main. Pipes may be sized by Tables S-5-1 and S-5-2, as for Fig. S-5-3.

Work Problem S-5-2.

Fig. S-5-5 shows a section of a steam and a return main, with connections to radiators on a second and third floor. The return is run wet. When the combined area of radiators A and B is as much as 200 sq. ft., or as compared with other radiator groups of the same system the supply branch would be considered large, pipe sizes should be obtained from Table S-5-3, otherwise from Table S-5-2.

Work Problem S-5-3.

Fig. S-5-6 shows a radiator group where a dry return is used. Tables S-5-1, S-5-2, and S-5-3 are used for sizing this arrangement, similarly as for Fig. S-5-5.

Work Problem S-5-4.

Two-pipe systems may be installed with overhead as well as basement mains. Fig. S-5-7 shows three radiators in a two-pipe down-feed system. The drop supply riser in this arrangement should always be sealed in a manner similar to that for the return riser so as to assure the impossibility of steam passing down the drop supply and into the return line. Sizes of pipes may be established from Tables S-5-1, S-5-2, and S-5-3.

Work Problem S-5-5.

(To be continued)

Piping Features of a Steam Laundry

THE soap, soda and bleach in the Ideal Laundry, in San Francisco, are piped from the mixing tanks in the soap make-up room in underground trenches to the wash lines. The soap and bleach are made up in concrete vats with metal casings and are carried to the washers in copper pipes, the soap pipe line containing a small steam pipe inside and discharging into the soap vat. This arrangement is designed to prevent cooling and congealing in the pipe. The soap and bleach lines end in faucets under which buckets may be placed. To facilitate the handling of these supplies without spilling them on the floor, a small iron pipe frame has been provided under the faucets. In this a bucket may be placed. Under it a funnel-shaped arrangement catches all overflow and deposits it in additional buckets standing on the floor underneath.

All of the steam and water lines from the power plant to the wash units, as well as the soap, soda and bleach pipes, are carried in floor trenches varying from 9 in. wide by 6 in. deep to 2 ft. wide by 15 in. deep. Thus the laundry is entirely free from overhead pipes. To give a smooth, unbroken trucking floor, combined with ease of access to the pipe lines, the covers of the trenches consist of reinforced concrete blocks from 2 in. to 3 in. thick.

The boiler room is 32 ft. by 50 ft. with a 23-ft. ceiling. It is separated from the main laundry by a fire wall. The boiler room is equipped with a 180 h.p. boiler, with space for another of the same size. The water storage system is under the floor of the laundry. This consists of a hard water storage tank of 75,000 gal. capacity, a soft water storage tank of 50,000 gal. capacity and brine storage tank of 20,000 gal. capacity. There is a well 217 ft. in depth which is equipped with a pump of approximately 6000 gal. of water an hour.

In the gasoline room in the dry-cleaning department all equipment is wired for static, and grounded. Every precaution is taken against fire, not only for extinguishing by means of a perforated steam line operated by a quick-opening valve outside of the room, which would flood the place with steam, but also for preventing a blaze, in the first place.

The Heating and Ventilating Magazine

A Monthly Journal of Engineering Progress

MEMBER
National Publishers' Association
Associated Business Papers, Inc.
Audit Bureau of Circulations
National Trade Extension Bureau

VOL. 23 September, 1926 No. 9

Published Monthly at New York, N. Y., by the
HEATING AND VENTILATING MAGAZINE COMPANY
A. S. ARMAGNAC . . . . . President and Editor
GUSTAVE PETERSEN . Treasurer and Business Manager
P. E. FANSLER, ... Associate Editor
A. M. DANIELS, ... Contributing Editor

Executive and Editorial Offices . . 1123 Broadway, New York

Western Office . . . . . 105 So. Dearborn St., Chicago
CLIFF W. PRESDEE, Manager

European Representative
W. G. Hollinworth, 38, Victoria St., London, S.W.

Subscription	$2.00 per year
Canada	2.50 per year
Foreign Countries	3.00 per year
Back Numbers	50 cents each

IN preparing the material for this issue it has been apparent from the first that a new conception was necessary of the term "Conservation." Whereas, in former years, it was generally understood in the heating industry to apply strictly to the saving of fuel, the progress of oil and gas heating has brought in new considerations which are now recognized as having a vital bearing on the whole subject. We have been overlooking the conservation of the user's time and energy; yet, in the last analysis, the user is the most interested party of all.

AT the same time, there is no intention to belittle, in the least, the importance of eliminating the waste and inefficiency so frequently found in heating plants supposed to be properly designed and operated. Modern science has provided means for reducing fuel wastes to a minimum. Many of these means are described and illustrated in this issue, including such measures as building insulation, refinements of thermostatic control, appliances for burning cheap coal, and the like.

ONE of the striking features of the conservation movement is the whole-hearted support being given to it by those in the heating industry who, at first thought, might be affected adversely. In this connection it is a fact that the building insulating people, at first, carried on their campaigns independently of the heating industry, acting under the impression that the interests of the two groups were antagonistic. It appeared to them that heating men would not look with favor on a movement which reduced the size of their contracts. Also, in the district heating field it took a concerted effort on the part of the National District Heating Association to educate the companies to see the advantage of co-operating with their customers in an effort to reduce the size of the heat bills.

We know now that, so far from curtailing the business of heating, such a policy promotes it by creating a wider demand for the kind of service modern heating systems are capable of giving.

ACCOUNTS of new apparatus and appliances always appeal to men of a mechanical turn of mind. When such accounts relate to devices in their particular field, they have a correspondingly greater appeal. In view of this fact, more than usual interest attaches to a policy as expressed by one of the leading firms in the heating industry:

"Have you ever noticed," writes this firm, "that we never send you descriptions of our new products? There is a reason for this. We are unwilling to broadcast announcements of any products until they have been thoroughly tested in practical use. By the time their merits have been fully established and all the wrinkles ironed out in their design and construction, they are no longer new."

There can be nothing but praise for such an attitude, but is it the whole story? A great deal depends upon the reputation of the firm behind the product. We feel safe in saying that at least a score of firms in the heating and ventilating industry have so won the confidence of the industry that any new products they place on the market will be accepted as having at least substantial merit.

As a matter of fact, an analysis of the new apparatus and appliances department of any reputable engineering or trade journal will show that very seldom is a product put out which has not undergone considerable testing. Where the exception occurs it may almost always be traced to the enthusiasm of the less experienced firms and, where no facts or data are given to substantiate the manufacturers' claims, the discriminating reader will make due allowance. In weighing the comparative advantages of announcing new products when they are ready for the market, as against waiting until they have proved their serviceability, the question hangs largely on the reputation of the manufacturer as a thoroughly-established and reliable firm. Such a firm may be relied upon not to waste its time and effort in marketing new products of doubtful value.

Fuel Economies in Forced Draft for School Heating Plants

IN the last six years, Selig & Wilson, consulting engineers, of Harrisburg, Pa., have changed the heating plants of over one hundred school buildings from natural draft, using large anthracite and bituminous coals, to forced draft systems, using the much less expensive fine steam size of mine or river anthracite coals. This has involved engineering service and equipment for twelve complete school districts in eastern Pennsylvania, as well as work in many scattered districts. In such cities as Harrisburg, Easton and Sunbury, it has included equipping elementary, junior high, senior high and even portable schools throughout, with consumptions per school ranging from eight to over six hundred tons of coal a year.

Up to last year, states E. T. Selig, the firm, in a report on the subject, issued by the H. P. Gould Co., Chicago, used a stationary grate, but recently, even better results are reported with a shaking grate of the firm's own design. Control in most cases is combined hand and automatic. The latter is either thermostatic control, pressure regulation, or a combination of the two.

UTILIZATION OF "RIVER COAL"

In Harrisburg, it was found that "river coal" could be used as a fuel. This coal is a fine anthracite formerly screened out and thought of no value, and consequently allowed to slide down hills from the mines into the Susquehanna River.

Since this coal was found to be high in heat value, millions of tons have been reclaimed from the river bed at exceedingly low cost.*

In Harrisburg, the firm found that with forced draft, this river coal would effect great savings in annual fuel expense. Six years ago, Selig & Wilson proposed to the school board to change over from the use of large anthracite and natural draft. In most cases, the firm contracts to make the change over itself, its remuneration being based on the savings made during the first three or four years of operation with forced draft.

*An article dealing with recovery of "river coal" was published in The Heating and Ventilating Magazine for April, 1923.

Forced Draft Installation in Steele Grade School, Harrisburg

During the first year this plan was tried, all difficulties were overcome. Each installation is designed individually. The firm first determines the amount of coal per hour required to meet maximum conditions and from that determines the size of fan and grate to use.

The shaking grate recently adopted loses less unburned coal than the stationary grate did, and also reduces the chances of burning out a grate. The shaking grate shakes down the fine ash as it forms, and this is cleaned out through the ash pit. This method materially reduces the ash-pit pressures required, and that in turn affects the blower.

Another Typical Forced Draft Installation in Harrisburg

ADAPTABLE TO STEAM BOILER OR WARM-AIR FURNACE

Next in importance to the blower and grate is the control. Hand and automatic control for both air and electric power are found to give maximum efficiency, while safeguarding boilers against excessive pressures. There are many records of installations where inadequate control caused wrecked boilers and equipment.

These forced draft installations have been adapted to nearly every make of steam boiler and warm-air furnace on the market. The only exception is a few round metal warm-air furnaces not of airtight construction. Warm-air furnaces, thus equipped, have shown results rivalling steam installations for satisfaction and efficiency.

QUICKER FIRES LESSEN JANITOR LABOR

At first, without exception, school janitors were very apprehensive about making the change, because they were sure more labor would be required. They soon found out, however, because of being able to bring their fires up so much quicker with forced draft, that they did not have to be on the job until 7 o'clock in the morning to have their buildings fully heated before the opening of school. With natural draft, they had to be up at 4:30 or 5 o'clock on cold winter mornings. It is possible also now to bank the fires Friday afternoon and not touch them until Monday morn-

The Heating and Ventilating Magazine

A Monthly Journal of Engineering Progress

MEMBER
National Publishers' Association
Associated Business Papers, Inc.
Audit Bureau of Circulations
National Trade Extension Bureau

VOL. 23 September, 1926 No. 9

Published Monthly at New York, N. Y., by the
HEATING AND VENTILATING MAGAZINE COMPANY
A. S. ARMAGNAC . . . . . President and Editor
GUSTAVE PETERSEN . Treasurer and Business Manager
P. E. FANSLER, ... Associate Editor
A. M. DANIELS, ... Contributing Editor

Executive and Editorial Offices . . 1123 Broadway, New York

Western Office . . . . . 105 So. Dearborn St., Chicago
CLIFF W. PRESDEE, Manager

European Representative
W. G. Hollinworth, 38, Victoria St., London, S.W.

Subscription	$2.00 per year
Canada	2.50 per year
Foreign Countries	3.00 per year
Back Numbers	50 cents each

IN preparing the material for this issue it has been apparent from the first that a new conception was necessary of the term "Conservation." Whereas, in former years, it was generally understood in the heating industry to apply strictly to the saving of fuel, the progress of oil and gas heating has brought in new considerations which are now recognized as having a vital bearing on the whole subject. We have been overlooking the conservation of the user's time and energy; yet, in the last analysis, the user is the most interested party of all.

AT the same time, there is no intention to belittle, in the least, the importance of eliminating the waste and inefficiency so frequently found in heating plants supposed to be properly designed and operated. Modern science has provided means for reducing fuel wastes to a minimum. Many of these means are described and illustrated in this issue, including such measures as building insulation, refinements of thermostatic control, appliances for burning cheap coal, and the like.

ONE of the striking features of the conservation movement is the whole-hearted support being given to it by those in the heating industry who, at first thought, might be affected adversely. In this connection it is a fact that the building insulating people, at first, carried on their campaigns independently of the heating industry, acting under the impression that the interests of the two groups were antagonistic. It appeared to them that heating men would not look with favor on a movement which reduced the size of their contracts. Also, in the district heating field it took a concerted effort on the part of the National District Heating Association to educate the companies to see the advantage of co-operating with their customers in an effort to reduce the size of the heat bills.

We know now that, so far from curtailing the business of heating, such a policy promotes it by creating a wider demand for the kind of service modern heating systems are capable of giving.

ACCOUNTS of new apparatus and appliances always appeal to men of a mechanical turn of mind. When such accounts relate to devices in their particular field, they have a correspondingly greater appeal. In view of this fact, more than usual interest attaches to a policy as expressed by one of the leading firms in the heating industry:

"Have you ever noticed," writes this firm, "that we never send you descriptions of our new products? There is a reason for this. We are unwilling to broadcast announcements of any products until they have been thoroughly tested in practical use. By the time their merits have been fully established and all the wrinkles ironed out in their design and construction, they are no longer new."

There can be nothing but praise for such an attitude, but is it the whole story? A great deal depends upon the reputation of the firm behind the product. We feel safe in saying that at least a score of firms in the heating and ventilating industry have so won the confidence of the industry that any new products they place on the market will be accepted as having at least substantial merit.

As a matter of fact, an analysis of the new apparatus and appliances department of any reputable engineering or trade journal will show that very seldom is a product put out which has not undergone considerable testing. Where the exception occurs it may almost always be traced to the enthusiasm of the less experienced firms and, where no facts or data are given to substantiate the manufacturers' claims, the discriminating reader will make due allowance. In weighing the comparative advantages of announcing new products when they are ready for the market, as against waiting until they have proved their serviceability, the question hangs largely on the reputation of the manufacturer as a thoroughly-established and reliable firm. Such a firm may be relied upon not to waste its time and effort in marketing new products of doubtful value.

Fuel Economies in Forced Draft for School Heating Plants

IN the last six years, Selig & Wilson, consulting engineers, of Harrisburg, Pa., have changed the heating plants of over one hundred school buildings from natural draft, using large anthracite and bituminous coals, to forced draft systems, using the much less expensive fine steam size of mine or river anthracite coals. This has involved engineering service and equipment for twelve complete school districts in eastern Pennsylvania, as well as work in many scattered districts. In such cities as Harrisburg, Easton and Sunbury, it has included equipping elementary, junior high, senior high and even portable schools throughout, with consumptions per school ranging from eight to over six hundred tons of coal a year.

Up to last year, states E. T. Selig, the firm, in a report on the subject, issued by the H. P. Gould Co., Chicago, used a stationary grate, but recently, even better results are reported with a shaking grate of the firm's own design. Control in most cases is combined hand and automatic. The latter is either thermostatic control, pressure regulation, or a combination of the two.

UTILIZATION OF "RIVER COAL"

In Harrisburg, it was found that "river coal" could be used as a fuel. This coal is a fine anthracite formerly screened out and thought of no value, and consequently allowed to slide down hills from the mines into the Susquehanna River.

Since this coal was found to be high in heat value, millions of tons have been reclaimed from the river bed at exceedingly low cost.*

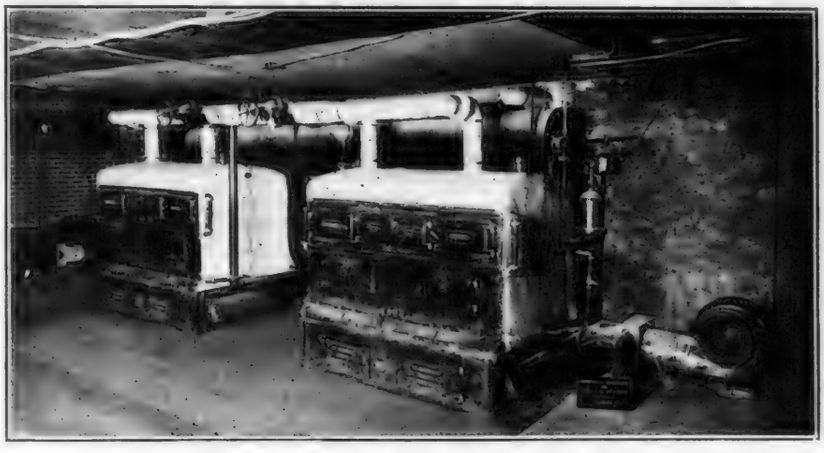
In Harrisburg, the firm found that with forced draft, this river coal would effect great savings in annual fuel expense. Six years ago, Selig & Wilson proposed to the school board to change over from the use of large anthracite and natural draft. In most cases, the firm contracts to make the change over itself, its remuneration being based on the savings made during the first three or four years of operation with forced draft.

*An article dealing with recovery of "river coal" was published in The Heating and Ventilating Magazine for April, 1923.

Forced Draft Installation in Steele Grade School, Harrisburg

During the first year this plan was tried, all difficulties were overcome. Each installation is designed individually. The firm first determines the amount of coal per hour required to meet maximum conditions and from that determines the size of fan and grate to use.

The shaking grate recently adopted loses less unburned coal than the stationary grate did, and also reduces the chances of burning out a grate. The shaking grate shakes down the fine ash as it forms, and this is cleaned out through the ash pit. This method materially reduces the ash-pit pressures required, and that in turn affects the blower.



Another Typical Forced Draft Installation in Harrisburg

ADAPTABLE TO STEAM BOILER OR WARM-AIR FURNACE

Next in importance to the blower and grate is the control. Hand and automatic control for both air and electric power are found to give maximum efficiency, while safeguarding boilers against excessive pressures. There are many records of installations where inadequate control caused wrecked boilers and equipment.

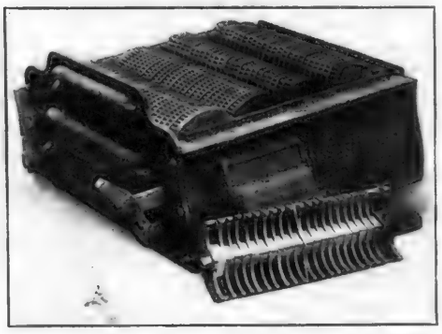
These forced draft installations have been adapted to nearly every make of steam boiler and warm-air furnace on the market. The only exception is a few round metal warm-air furnaces not of airtight construction. Warm-air furnaces, thus equipped, have shown results rivalling steam installations for satisfaction and efficiency.

QUICKER FIRES LESSEN JANITOR LABOR

At first, without exception, school janitors were very apprehensive about making the change, because they were sure more labor would be required. They soon found out, however, because of being able to bring their fires up so much quicker with forced draft, that they did not have to be on the job until 7 o'clock in the morning to have their buildings fully heated before the opening of school. With natural draft, they had to be up at 4:30 or 5 o'clock on cold winter mornings. It is possible also now to bank the fires Friday afternoon and not touch them until Monday morn-

ing, unless there is danger of freezing in the building.

In Easton, during the Christmas recess of 1923, when the weather was unusually severe, one janitor let the fires go out before vacation and did not touch them until the day school opened two weeks later. He started his fires at



Shaking Grate Designed by Selig & Wilson for Burning Small-Sized Coal

5:30 that morning and by 8 o'clock the building was up to 70° F.

FORCED DRAFT REQUIRES NO MORE COAL

As to the savings possible with this system, in the first place, the quantity of fine coal consumed, using forced draft, has been found to be no greater than the quantity of large anthracite and bituminous coal required, using natural draft. In fact, in most cases, it was found that less fine coal is used.

A typical example is that of the Central High School of Harrisburg, which burned 323 tons of a mixture of pea and broken anthracite its last year under natural draft. With forced draft, the second year's operation showed a consumption of 296.12 tons of fine coal, making a saving in fuel cost of five-sixths over the last year of natural draft operation.

Another case is that of sixteen small school buildings in Harrisburg, which used 2,121 tons of fine coal with forced draft. This was only 48 tons more than the amount of large coal used the previous winter.

Harrisburg has reduced fuel costs in its schools over 75% by these improvements. Its present fuel consumption is about 7,500 tons a year. Under old prices for large coal ($12.00 per ton), this would cost $90,000.00. They now purchase river coal at $2.20 per ton, making the cost $16,500.00. Current for the blower averages 30c a ton—an additional cost of $2,250.00. The total saving in fuel amounts to $71,250.00 for the year.

The comparison of coal costs in Harrisburg is hardly a fair one, however, because it must be made between the large anthracite and the very cheap river coal.

Easton, however, affords a typical example of normal savings. Here the school board pays $4.50 to $5.00 a ton for fine rice coal delivered at the school bins. Large anthracite costs from $14.00 to $18.00 a ton.

In a year their fuel costs for heating twelve schools and a library were reduced from $16,000.00, using large anthracite, to less than $7,000.00, using forced draft and fine mine run coal.

In every case the change over (and it is an expensive change, varying according to size and conditions) has paid for itself between the second and third year of its operation.

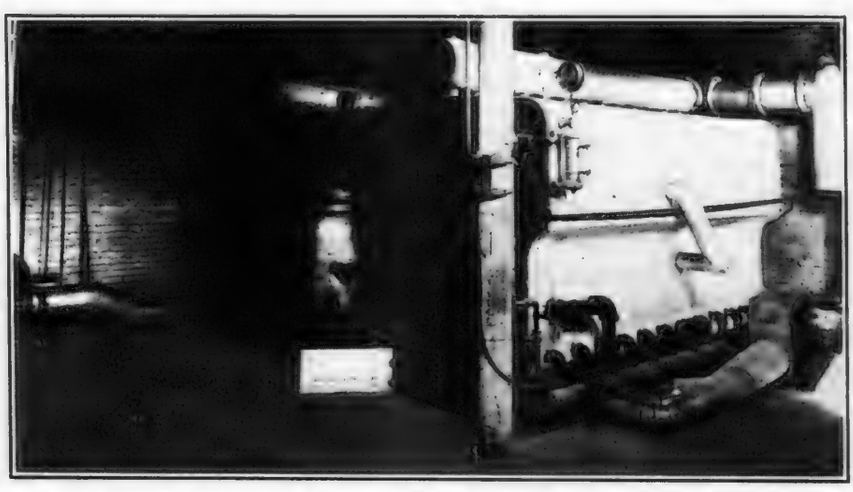
In practically all of the cases cited the forced draft equipment comprised Sirocco fans, driven by ball-bearing motors.

"Or Equal" Clause Called a Trouble Maker

Under the headline of "The Will-o'-the Wisp," Toch Brothers Division of the Standard Varnish Works, New York, pays its compliments to the "or equal" clause in contracts. "The Will-o'-the-Wisp," states the company, in one of its recent advertisements, "that shines over treacherous swamps has its architectural counterpart. It is the 'or equal' clause, very apt to lead architect, producer and client into a bog of misunderstanding, needless expense and hard feeling.

"Commodities cannot be identified in value. Your clients know this, which is an important reason for placing their building commission in your hands. They rely upon your judgment of the quality of building material and the service given by the makers to secure full value for their money.

"The decision as to the efficiency of every bit of material going into a building must be made at some time. The responsibility is yours—and once made the decision should be strictly adhered to, for your own, as well as your client's advantage."



Forced Draft Equipment, Showing Branch Ducts, in Harrisburg Installation

Need for Better Estimating Methods

At the suggestion of George K. Banzhof, of the Detroit Chapter of the National Association of Plumbing and Heating Salesmen, the association has started a discussion with the object of educating plumbing and heating contractors so that they will be able to feature jobs at a profit.

"The prices submitted nowadays" declares Mr. Banzhof, "are absolutely ridiculous. According to these prices as submitted it stands to reason that the work cannot be done right and in a short time this work will, in many cases, be injurious to the health of the public."

Mr. Banzhof's letter was read at the July meeting of the Detroit Chapter of the association and it was the consensus of opinion of the members present that the subject was one which could be discussed to advantage throughout the industry.

Bringing the Convention Home

As in previous years, the Steam Heating Service Department of the Boston Edison Company has reproduced, on a miniature scale, the convention of the National District Heating Association, held at Niagara Falls, June 1-4. More than twenty representatives from various companies interested in central station steam heating were present at the miniature convention.

In order to bring the proceedings within the time allotted, which was one day, the papers and reports were abstracted as much as possible. The meeting was held in the library of the company's service building in Roxbury, Mass. Davis S. Boyden acted as chairman, M. S. Wade as vice-chairman and H. L. Martin as secretary.

Following the opening remarks by Mr. Boyden, the principal subjects presented at the Niagara Falls convention were brought up, including the reports of the Station Operating Committee, Heating Research Committee, Distribution Committee, Rates and Regulation Committee, Heat Utilization Committee and Operating Statistics Committee. The meeting concluded with a presentation of the methods pursued by the Indianapolis Light & Heat Co. in controlling the steam heat supply.

Montclair, N. J., in Throes of Open-Window Agitation

ONE of the latest cities to be afflicted with the so-called open-window ventilation craze is Montclair, N. J., where an engineering member of the Board of Education has seized upon the report of the New York State Commission on Ventilation as containing the answer to its school ventilation problems. Of course, the term "open-window ventilation," as it is being used, is a misnomer, since what is really meant is uncontrolled ventilation.

In Montclair, the ball was started rolling by the Home and School Association of the Montclair Senior High School, which sent a resolution to the Board of Education relating to the heating and ventilation conditions in that building. The board thereupon appointed one of its members, Ray Potter Perry, to make an exhaustive survey of conditions and report back to the board on the subject.

REPORT PREPARED ON SHORT NOTICE

In a surprisingly short time, Mr. Perry was ready with his report, which started off, innocently enough, with the statement that "the questions raised by the resolution of the Home and School Association with regard to the operation of the humidifying equipment at the Senior High School cannot adequately be considered aside from the ventilating and heating system of which the humidifiers are a part. The problem is much more complicated than appears on the surface and before taking up the local details, it is necessary to supply a background about ventilating and heating in general."

Mr. Perry proceeded to fill his background with liberal quotations from the report of the New York State Commission on Ventilation, quoting at length its conclusion on open-window ventilation.

THE BOARD'S RESOLUTION

Not only was Mr. Perry's report accepted *in toto*, but a resolution was passed expressing to the Home and School Association the board's appreciation of its interest and stating that "it had been decided to continue the practice of operating the humidifier in connection with the auditorium system, to discontinue the operation of the humidifier in connection with the classroom system and to follow up the matter of heating and ventilating in all of the schools to the end of securing the best result obtainable."

As Montclair is the home town of the editor of THE HEATING AND VENTILATING MAGAZINE and as the conditions brought about by Mr. Perry's report were almost identical with those experienced in a midwestern city, the following was submitted, which appeared in the *Montclair Times* for August 18:

(From the Montclair Times for August 18, 1926)

VENTILATION ISSUE RAISED

OPEN WINDOW METHOD DECLARED INADEQUATE BY MONTCLAIR CORRESPONDENT

States Present Day Mechanical Method of Ventilation is Superior to That Arranged For Use in the Montclair High School—Cites Similar Case in Illinois School Where Mechanical Method Was Discarded Only to Be Returned to at Later Date.

To the Editor of the *Times;* Sir:—The genius of modern engineering lies in its ability to control conditions. What shall we say, then, of the proposal which apparently has been sponsored by the Board of Education to adopt window ventilation for the Montclair schools?

Coming on top of a report by Ray Potter Perry, on which the board's action was based, which quoted freely from the report of the New York State Commission on Ventilation favoring the open-window method of ventilation, this is the only interpretation which can be put on that part of the resolution adopted by the board undertaking "to follow up the matter of heating and ventilating in all of the schools to the end of securing the best result obtainable." It presents a situation which may well engage the interest of every citizen. According to the account in the *Times*, the resolution passed by the Board of Education went on to state that it had been decided to continue the practice of operating the humidifying system in connection with the auditorium of the Montclair Senior High School; that it had been decided to discontinue the operation of the humidifiers in connection with the classrooms, the resolution concluding with the cryptic statement above quoted.

CONCLUSIONS CHALLENGED

Now, Dr. C.-E. A. Winslow, of the Yale School of Medicine, who was chairman of the New York State Commission on Ventilation, is an avowed open-window ventilation advocate. The conclusions reached by this commission have been sharply challenged by the American Society of Heating and Ventilating Engineers, whose research laboratory at the Bureau of Mines Experiment station in Pittsburgh, Pa., has done some extensive work in defining correct atmospheric conditions for humans. Apparently, Mr. Perry did not consult with members of this association or with the officials at its Research Laboratory, but accepted without question the dicta of the New York State Commission.

Outside of the open-window arguments contained in the report, it is well known that the commission's experiments on humidification were entirely too short and incomplete to be at all conclusive, while its investigation of the effect of ozone was confined to a single school building with a type of apparatus which has long since become obsolete. With these facts in mind, the guarded way in which the commission presents its conclusions will be better understood:

"The combination of high temperature with high humidity," states the report, "is the most serious question with which we have to deal in ventilation. * * * * * In general, it does not seem that there is at present any sound evidence which justifies humidification of the air of the ordinary occupied room on physiological grounds."

SIMILAR EXPERIENCE

Montclair is not the first community to have experienced the agitation resulting from the publication of the report of the New York State Commission on Ventilation. Recently, the city of Alton, Ill., passed through a similar experience and it may be worth while to give the particulars.

Basing its actions to a great extent on the conclusions of Dr. C.-E. A. Winslow, chairman of the New York State Commission on Ventilation, the decision was reached by the school board authorities in Alton to discard the proposed mechanical system of heating and ventilation for the Alton high school and to adopt the open-window method. Before the plans were carried out, however, the board was given such convincing evidence as to the relative advantages of mechanically-ventilated and open-window ventilated schools that the final decision was to revert to the mechanical system and that was the system installed.

Since reading the report submitted by Mr. Perry and believing the experience of the Alton people might be of interest, the writer communicated with the architects of the Alton high school, Messrs. Royer, Danely and Smith, who make the following statement under date of August 3, 1926:

"Between the time we were awarded the architectural work on the Alton school and the time we were instructed to proceed with the preliminary drawing, the school superintendent, Mr. Curtis, interested himself greatly in methods of ventilating school buildings. After hearing Dr. Winslow's speech at Decatur, Ill., before a convention of Illinois school superintendents, he became very much in favor of window ventilation.

"After the approval of all preliminary drawings, the question of ventilation was brought up by the writer before we started on the working drawings. At the board meeting, Mr. Curtis requested that window ventilation be designed for their new building. The writer immediately took issue with Mr. Curtis, ask-

ing him his reasons for this request. He, in turn, replied that he was not competent to debate the merits of the various ventilating systems against anyone having the writer's experience in that line of work. The writer, not wanting to argue with Mr. Curtis, suggested that we both get disinterested parties to present the merits of different ventilating systems to the school board and this procedure was heartily agreed to by everyone. .

"Mr. Curtis invited Dr. Dressler, of Peabody University, who writes bulletins on schoolhouse design and equipment for the government, and we invited Edwin S. Hallett, chief mechanical engineer for the St. Louis Board of Education. We met on a Saturday morning and Dr. Dressler was given the first opportunity to talk. He used as his authority for recommending the window type of ventilation, the report of the New York State Commission on Ventilation and the report of Dr. C.-E. A. Winslow. He described this method of ventilation and recommended fresh air through windows as the ideal condition for the health of school children. At the close of his talk, the writer took it upon himself to ask him the following questions:

"How much fresh air per minute is required for each person in a room?

"What air movement is essential to comfort?

"What per cent of relative humidity would he recommend for comfort in the room?

"Is recirculation of air advisable for school use?

"How soon does air that has been reused become poisonous?

"Would he recommend ozone in circulating air?

"No one of these questions was answered in any sensible manner and it seemed that everything was done to discredit the ordinary intelligence of those present. An amusing reply came from the question as to the comparative cost of window ventilation and mechanical ventilation. The reply was that the cost was nothing—just open the windows.

CITES COST DATA

"Mr. Hallett was then given the floor and he furnished us with cost data, operating expenses and health reports of the various schools in St. Louis. One statement he made, which was very interesting, was that in one of the St. Louis schools, the cost per pupil for fuel during the year was thirty-five cents. He later verified this statement by taking the school board to the building and showed us records kept by the engineer in charge. He also recommended recirculation of air to as high an extent as ninety per cent, with ozone treatment to kill the odors and air washers to remove the dust, etc.

"When Mr. Hallett was through speaking, the writer put to him the questions given to Dr. Dressler and they were answered very concisely and to the entire satisfaction of those present.

"At the end of the meeting, Dr. Dressler asked if it would be possible for us to go to St. Louis that afternoon and see the schools and hear Mr. Hallett discuss ventilation further. A week later, the school board, accompanied by the writer, went to St. Louis, visited three school buildings, saw the different types of ventilation, saw the students, instructors, superintendents and were convinced that a fan blast system of heating, with reheating units at the base of the ventilating stack, and recirculation of air with ozoning and washing, high-pressure steam boilers operating fan and pump engine, were the most efficient and best methods of ventilating school buildings.

"The building at Alton was designed with the above described system of heating and ventilating at a total cost of $710,000, with the heating and ventilating costing $111,000. The cubic contents cost was thirty cents per cubic foot, including heating, ventilating, plumbing and wiring. The cubic contents of the building are 2,300,000 cubic feet."

Progress in all branches of science centers around our ability to control the processes we are using. We may be far from reaching the final determination of the best means of ventilating our schoolrooms, but it is certain that we will not be willing to give up our present-day mechanical methods for such an uncontrolled method as the open window.

A. S. ARMAGNAC,
President, Heating and Ventilating Magazine Company.

The foregoing experience, we take it, is typical of what is to be expected in an increasing number of communities and the industry will need to be on the alert to counteract the persistent and widespread propaganda in favor of the open window.

Thermo Laboratory at University of Kentucky

With the construction of a new building at the University of Kentucky to house the automotive department of the College of Engineering to be in readiness this fall, space has become available for the establishment of a Thermo Laboratory for the study of all problems relating to heat and heat-transmission devices. The flow of heat, efficiency of various fuels, the transmission of heat from radiators and other materials will be investigated, as well as the efficiency of various types of gas and oil burners. Professor L. S. O'Bannon will be in charge of the laboratory.

A special apparatus for testing ventilating fans according to the code of the A.S.H. & V.E. and the A.S.M.E. will be used. This code was prepared during Dean Anderson's incumbency as director of the A.S.H. & V.E. Research Laboratory in Pittsburgh.

Heat Contents of Different Grades of Oil

Designations, such as distillate, gas-oil and fuel-oil, are apt to create a misapprehension unless it is known just what grade is specified. For instance, a statement may be made that a given burner is adapted to burn fuel-oil containing 141,790 heat units per gallon and it might be thought, from the mere statement, that this was one of the heaviest oils that could be burned in a domestic heater.

In order to give a clear conception of the range of domestic oils, the following list is appended, which shows the heat contents of the various grades, together with their gravities:

GRADES OF OIL

	Heat Units per Gal.	Baume Gravity
Kerosene	132,858	36
Distillate	136,887	40
Gas-oil	138,926	35
Fuel-oil	141,790	30
Fuel-oil	143,144	28
Fuel-oil	145,612	24
Fuel-oil	148,209	20
Fuel-oil	150,931	16

American Oil Burner Association Activities

Bulletin No. 24 of the American Oil Burner Association, issued August 10, notes the publication of the association's Handbook of Domestic Oil Burning (a review of this book will be found under the proper heading on another page of this issue). The announcement that the 1927 convention would be held at Buffalo on April 5-6-7, as reported in THE HEATING AND VENTILATING MAGAZINE for last month, is followed by the statement that all firms—manufacturers of both burners and equipment—must be members of the association to exhibit.

The bulletin also states that the board of governors at the July meeting gave considerable time to a discussion of the patent situation in the oil-burner industry. It would appear that a scheme of cross-licensing is favored to prevent internal friction and disruption of business.

Under the heading "Code of Ethics for Manufacturers and Dealers," it is stated that the committee on business standards and codes had submitted a tentative code for the conduct of members of the association in their relations with one another and the public in the manufacture and sale of oil-burning equipment. Several other items of less vital import are contained in the bulletin.

Summer Meeting of British Heating Engineers

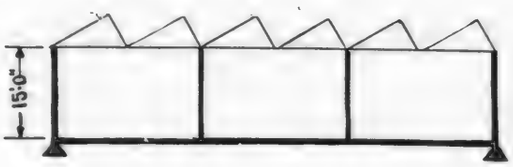
AIR-CONDITIONING and air-conditioning apparatus held the center of the stage at the summer meeting of the Institution of Heating and Ventilating Engineers at Scarborough, England, June 22. An exhaustive paper on the subject was presented by J. W. Cooling, M.Sc., A.M.I. Mech. E. Touching on the benefits afforded a manufacturing plant by air-conditioning apparatus, Mr. Cooling stated that the textile industry was the only one in England that made any attempt to improve working conditions through artificial control of the atmosphere.

Emphasizing the possibility of damaging the product in manufacture and of impairing the health of employees by improper atmospheric conditions, Mr. Cooling said that all industries dealing with hygroscopic materials would benefit by the use of air-conditioning apparatus. He then pointed out specifically how varying humidity affected cabinet-making, the textile industry and the printing and paper industry.

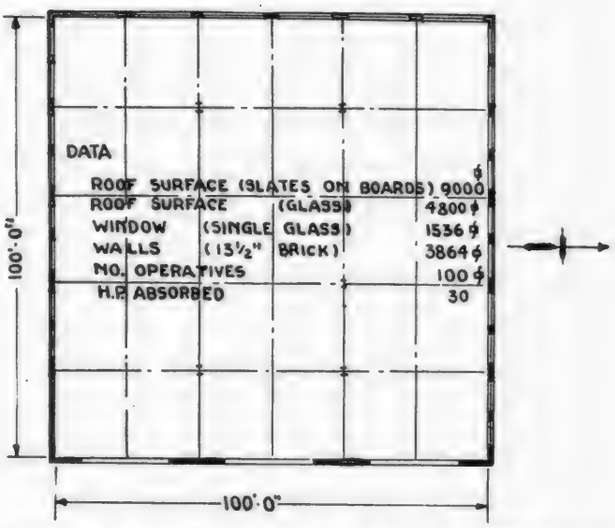
Mr. Cooling showed the calculations necessary in the design of a typical air-conditioning system in a factory to maintain definite relative humidity.

Taking a simple factory with north light roof, supposing it was proposed to maintain inside conditions of 65° F. and 66% relative humidity when the outside conditions were 75° F. and 70% relative humidity.

All sources of heat had to be considered, and the following were the most important:—(1) Heat from the sun; (2) Heat transmitted owing to the higher outside temperature; (3) Heat due to power expended in the factory; (4) Heat given off by operatives.



Plan of Factory Used in Typical Problem



In connection with item (1), very little information was available for conditions in England, but the following figures might be taken as approximate:

	B.T.U. per sq. ft. per hour
Sun effect on glass (skylight)	130
Sun effect on glass (vertical)	50
Sun effect on 13-in. brick wall	5
Sun effect on slates or boards	8

The source of heat from item (2) might be calculated from the ordinary constants for heat losses.

With regard to item (3), each horsepower of energy created 2,550 B.T.U. per hour.

The heat given off by operatives was usually taken at 400 B.T.U. per hour per person.

The dew-point to be maintained inside the factory was 53° F., which corresponded to a dry-bulb temperature of 65° F., with a relative humidity of 66%. Therefore the air admitted to the factory must be cooled down to 53° F., and must be saturated at that temperature, and the quantity of air admitted must be such that when its dry-bulb temperature rose from 53° F. to 65° F. it would have absorbed 345,488 B.T.U.

The mean temperature of the air admitted was 59° F., at which temperature 1 cu. ft. of air would absorb 0.0185 B.T.U. in rising 1° F., so that the amount of air required to absorb 345,488 B.T.U. when rising 65° — 53° = 12° F. would be:—

$$\frac{345{,}488}{0.0185 \times 12 \times 60} = 26{,}000 \text{ cu. ft. per min.}$$

TABLE I.
SUMMER CONDITIONS.

DRY BULB TEMPERATURE OUTSIDE 75°F INSIDE 65°F.
RELATIVE HUMIDITY OUTSIDE 70% INSIDE 66%
WET BULB TEMPERATURE 66°F. " 58°F
DEW POINT 53°F.

HEAT DUE TO RADIATION

SURFACE	AREA SQ. FT.	TEMPERATURE DIFFERENCE	COEFFICIENT	HEAT TRANSMITTED BTU/HOUR	
SLATES ON BOARDS	9000	10°F	0·43 BTU/ft²/DEG	38800	
GLASS ROOF	4800	10°F	1·20 "	57600	
GLASS WINDOWS	1536	10°F	1·10 "	16896	
13" BRICK WALL	3864	10°F	0·30 "	11592	
WOODEN DOORS	600	10°F	0·50 "	3000	
				127888	127888
HEAT DUE TO SUN EFFECT					
SLATES ON BOARDS	9000		8·0 "	72000	
WINDOWS (SOUTH)	480		50·0 "	24000	
13" WALL (SOUTH)	1020		5·0 "	5100	
				101100	101100
HEAT DUE TO POWER USED = 30 × 2550 =				76500	76500
HEAT DUE TO OPERATIVES = 100 × 400 =				40000	40000
TOTAL HEAT TO BE ELIMINATED BTU/HR					345488

TABLE II
WINTER CONDITIONS

DRY BULB TEMPERATURE. OUTSIDE 32°F. INSIDE 65°F.
RELATIVE HUMIDITY 100% " 66%
WET BULB TEMPERATURE 32°F. " 58°F
DEW POINT 53°F.
FACTORY RUNNING 8 HOURS A DAY AND SHUT DOWN DURING WEEKENDS.

SURFACE	AREA. SQ. FT.	TEMPERATURE DIFFERENCE	COEFFICIENT	HEAT LOSS BTU/HOUR.
SLATES ON BOARDS	9000	38°F.	0·43 BTU/ft²/DEG	47500
GLASS ROOF	4800	38°F.	1·20 "	218000
GLASS WINDOWS	1536	33°F	1·10 "	55800
13" BRICK WALL	3864	33°F.	0·30 "	38300
WOODEN DOORS	600	33°F	0·50 "	990C
CONCRETE FLOOR	1000	33°F	0·10	3300
				472800
ALLOW 33⅓% FOR WARMING UP AFTER WEEKEND.				157600
			BTU/HR.	630400

Summer and Winter Conditions in Typical Factory

The dehumidifier must, therefore, be capable of handling 26,000 cu. ft. of air per minute, and must reduce its temperature from 68° F. wet-bulb down to 53° F. and saturated.

The principal quantities required in connection with the apparatus were as follows:—

Fan to handle 26,000 cu. ft. of air per minute against the resistance of the air ducts, dehumidifier, and other equipment.

Dehumidifier to handle 26,000 cu. ft. of air per minute at a speed of about 550 ft. per minute through the mist chamber, and to circulate 240 gal. of water through the sprays.

Refrigerating apparatus to cool 240 gal. of water per minute from 52° F. to 43.8° F.

The Fans Standardization Committee had no report to make.

For the Boiler Rating Committee, W. W. Nobbs stated that the committee was not in a position to give a final report. The results of tests on the third boiler had been received, but the matter was not definitely settled.

For the Publicity Committee, Alcwyn A. Jones stated that the awards in the prize competition had been made to the following: Sirocco Premium, "Aerer," A. Hindley Saunders; Lumby Premium, "Icy Mountain," S. E. Greenland; London Prize, "Condenser," Frank S. Haddon.

A proposal made by the Technical Education Committee, that a Junior Section of the institution be formed, was adopted. According to the plan, meetings will be held exclusively for the junior members so that they can bring up subjects and express their views without being overawed by experts. It was suggested that a member of the council be chairman.

In the evening a banquet was held at the Grand Hotel. President Stott, who was accompanied by Mrs. Stott, occupied the chair, and was supported by the Mayor and Mayoress of Scarborough. Edgar Herring acted as toast master.

Variation in Municipal Chimney Codes

Interesting results of a questionnaire on building code requirements for the construction of chimneys are given by D. Knickerbacker Boyd in an article appearing in the *Quarterly* of the National Fire Protection Association, on "Stopping Fires Due to Chimneys and Flues." The questionnaire was sent out to cities in a selected territory and replies were received from ninety-one building officials.

"The tabulation of the replies," states Mr. Boyd, "was quite astounding as evidencing the lack of uniformity in requirements of the different cities.

"In spite of the lax provision," continues Mr. Boyd, "the entire responsibility cannot be placed on the building code" and he speaks of the many houses which are built without architects or the supervision of an architect's office. Very often, the workmen are not experienced in building construction and so, even when properly designed, specified and "coded," the complete chimney may be defective.

"In building a chimney," states Mr. Boyd, "each section of lining should be carefully placed on the section below with a thoroughly mortared joint, surrounded by not more than two courses of brick work, slushed in, to steady the lining. The brick work should then be built up around the lining, slushing in mortar between the brick and the lining as each course is laid with full bed and vertical joint."

One of the arguments presented for making smoke tests to insure tightness is that if the mason contractor knows that he will not be paid until all flues are tested and prove tight, he will take extra precautions to see that all his workers understand that condition and they in turn, realizing what it will mean to them to make them good if their work is defective, will take additional pains to do it well. In other words, thinks, Mr. Boyd, flues, under this provision, would almost automatically become tighter than now generally built.

"If each flue," he states, "is given a thorough smoke test, any leaks would be discovered that could be made good at once. It is important that the tests should be made with the mason contractor and not by the heating contractor. Specifications frequently call for the latter to test flues before commencing heating apparatus and to 'report any leaky flue for correction,' but by the time the mason may have left the building and perhaps have been paid and, as is often the case, the building itself may have been plastered or so far finished, that corrections are both difficult and costly and so the conditions are tolerated, in spite of the perpetual fire menace, as well as the annoyance and added cost of heating."

As a basis for a smoke test provision, Mr. Boyd suggests the following:

"Before the scaffolding is removed from around any chimney and before any chimney walls or breasts are plastered, but not until after the mortar has seasoned, each flue shall be given a separate and thorough smoke test by the mason contractor. The tests shall be made in the presence of the mason contractor, the heating contractor and the architect or their representatives.

"Leaks into adjacent flues shall be especially looked for and not more than one flue shall be tested at one time.

"Any leaks which may develop shall be promptly made tight before the chimney work will be accepted as satisfactory."

Heating Contractors' Chimney Resolution

FOLLOWING is the full text of the resolution on chimney construction adopted at the recent convention of the Heating and Piping Contractors National Association, in Washington:

Whereas, insufficient and defective chimneys are a frequent cause of faulty operation or failure of heating plants, and

Whereas, it is extremely difficult to find and also to remedy such defects after the walls have been furred or finished, be it

Resolved, that the building specifications and plans should give the size, height and construction of all chimneys and should require the mason contractor to apply a smoke test to each individual chimney flue and to demonstrate in the presence of the architect that it is tight, clear and productive of a sufficient draught, and that this should be done before the scaffolding is removed from around any chimney and before any chimney walls or breasts are plastered, but not until after the mortar has seasoned. Be it also

Resolved, that a copy of this resolution be forwarded to the American Institute of Architects and their cooperation solicited.

Also, that a copy be forwarded to the National Board of Fire Underwriters and that they be requested to establish such tests as a requirement before issuing an insurance policy.

Lives Ninety Minutes in Air-Tight Coffin

Much news interest was created during New York's "mid-summer madness" when Houdini submitted himself to being placed in a coffin 22 in. wide and 6 ft. long and then submerged for 1 hr. and 31 min. and 30 seconds in the Shelton Hotel pool, New York. The coffin was equipped with a telephone and an electric push button. A weight was attached to the coffin and it was then lowered to the depths of the pool.

An interesting feature of the test was the presence of Dr. W. J. Connell, who has participated in much of the research work at the A.S.H. & V.E. Research Laboratory in Pittsburgh and who has been a frequent speaker at meetings of the A.S.H. & V.E.

On emerging from his coffin, Houdini was examined by Dr. Connell, who found that the maximum temperature in the coffin had been 99° F. and that Houdini's pulse was 142, which was 70 above normal. Apparently, the magician was no worse for his long incarceration.

Anthracite Burning Equipment Manufacturers Organize

A NOTABLE movement in the small coal-burning equipment field has been inaugurated through the formation of the National Anthracite Burning Equipment Association, in New York, August 14. The officers are, President, W. D. Craven, Pyramid Iron Products Corporation, 136 Liberty St., New York; vice-president, F. B. Williams, Jr., Graybar Electric Company, 401 Hudson St., New York; treasurer, J. A. Nichols, American Blower Co., 50 Church St., New York; secretary, F. G. James, *New York Commercial*, 43 Park Row, New York. Directors: N. J. Allaben, vice-president, Federal Gauge Co., 25 Church St., New York; R. R. Rees, vice-president, Neemes Foundry, Inc., Troy, N. Y.; R. C. Beadle, Combustion Engineering Corporation, 43 Broad St., New York; Joseph J. Rathgeb, Rathgeb Grate Co., 16 East 43rd St., New York.

In the make up of the organization the membership has been divided into six divisions or classifications, including (1) grates, (2) blowers, (3) motors, (4) automatic electric controls, (5) stokers, (6) boilers. The following have already signified their desire to join the association.

Grates

Carbondale Grate Co., 2 Rector St., New York.
Neemes Foundry, Troy, New York.
Premier Coal Saving Device Corp., 151 Lenox Ave., New York.
Pyramid Iron Products Corp., 136 Liberty St., New York.
Wolf & Munier, 222 East 41st St., New York.
Heating-Economizing Co., 109 Broad St., New York.
Combustion Engineering Corp., 43 Broad St., New York.
Rathgeb Grate Co., 16 East 43rd St., New York.

Blowers

American Blower Co., 50 Church St., New York.
Champion Blower & Forge Co., Lancaster, Pa.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

Motors

Century Electric Co., St. Louis, Mo.
Graybar Electric Co., 401 Hudson St., New York.

Automatic Electric Control

Federal Gauge Co., 25 Church St., New York.
Minneapolis Heat Regulating Co., Grand Central Terminal, New York.

Stokers

Domestic Stoker Co., 137 Water St., New York.

Boilers

Molby Boiler Co., 41 East 42nd St., New York.

In outlining the purposes of the association, President W. D. Craven, in his opening address at the first meeting, stated:

"We have organized for the purpose of mutual benefit of all members and those interested in promoting the use of small-size anthracite coal, to expedite proper equipment and to co-operate in every legitimate way to give publicity to this cause.

"Our membership embraces some very important component parts, as under the various headings we have grates, motors, blowers, automatic controls, boilers, stokers and the anthracite coal interests.

"Our field of operation will be active wherever anthracite coal is used. Our endeavors can best be covered in planning activities to carry an additional campaign to the public and the local coal dealer and in various ways fulfill a growing demand in educating the public in the use of small-size anthracite coal.

"By improving the good-will among ourselves, by standardizing the equipment to the extent of giving the public a workable and satisfactory equipment, to add to our resources that mighty friend, the pen, or publicity offered us as an association.

"Many plans of action have been suggested; many can be put into service.

"First, however, in membership lies our strength so let each of us go forth with the idea that success means personal application for the association.

"Larger ships have been launched in the eastern States, but no better speed boat has been launched than your own little ship, herein christened the 'National Anthracite Burning Equipment Association'."

Central Heat Regulation Through Thermostatic Control of Service Valve

An economical device, designed for use in central plant heating, has been brought out by the Honeywell Heating Specialties Co., Wabash, Ind., under the name of the Honeywell low-pressure steam valve. This valve is actuated by a Honeywell low-voltage room thermostat. The motor and valve are built in one unit with a view of effecting positive and quick action, as well as economy in installation cost.

The valve unit is installed in the main steam supply line. The thermostat is located at a point most suitable for maintaining the temperature point that meets the requirements of the building. Under this positive control, only such steam is used as is actually needed. As soon as the room temperature, for which the room thermostat is set, is reached, it actuates the motor, causing the valve to close. As soon as the temperature falls slightly below that setting the thermostat signal, the motor and valve are opened.

A similar application, a trifle more complicated in installation, is the operation of a balanced valve in the main steam supply line through the Honeywell Type D electric motor, actuated by a room thermostat. At the command of the room thermostat the valve is opened through the use of a chain attached to the crank arm on the D motor. At the command of the thermostat, on the closing period, the pull on the chain is released by the rotation of the crank arm and the balance closes the valve.

How Unit Heaters Saved Money in Garage Heating

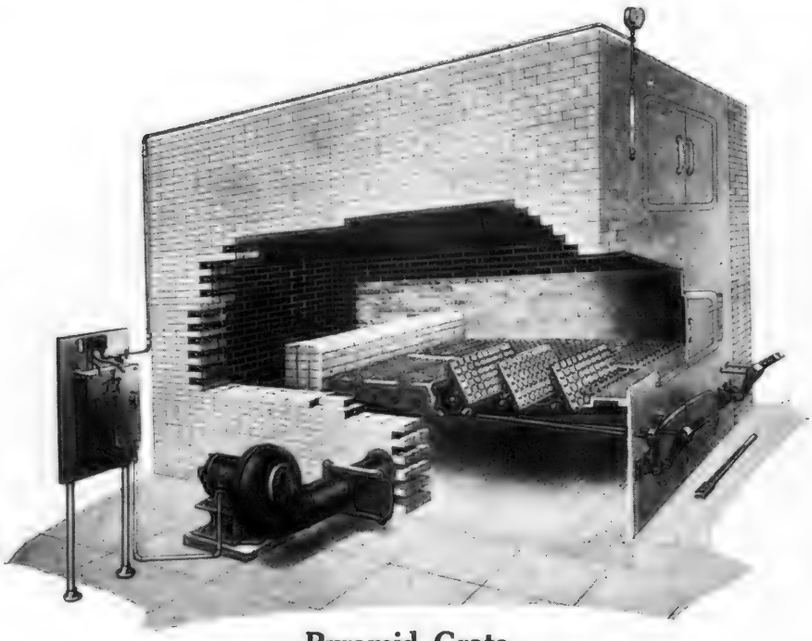
Some interesting comparative cost figures in connection with the heating of two garages, located in the same city, both using central heat and in which the heat losses are practically identical, furnish impressive evidence of the adaptability of the unit heating method to this class of work. In garage No. 1, Venturafin portable unit heaters were installed, with recirculating boxes, taking cold air from the floor. In garage No. 2, an ordinary steam heating system was installed which does not provide for taking air from the floor level.

The reduction in the heating cost of garage No. 1 for January over December is accounted for by the fact that a thermostat was installed the latter part of December.

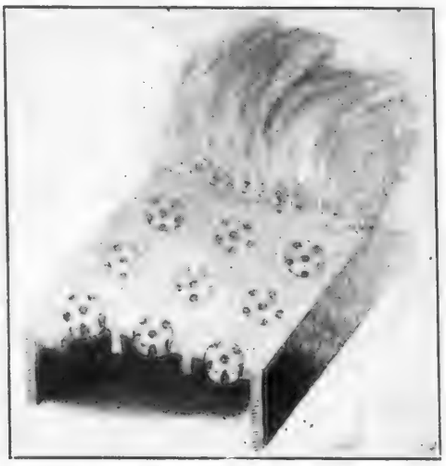
The savings were effected by keeping the breathing zone comfortable and preventing the heat from concentrating in the upper part of the room. All of the figures were furnished by the city engineers and may be accepted as authentic. The main thing they illustrate, it is pointed out, is the possibility for conserving fuel by installing a system which does not overheat the upper strata of the air.

COMPARATIVE COSTS OF HEATING TWO GARAGE BUILDINGS

Garage No. 1		*Garage No. 2*	
October	$31.98	October	$38.61
November	38.61	November	90.09
December	93.21	December	135.53
January	80.19	January	146.52
February	80.19	February	151.47
March	55.44	March	120.78

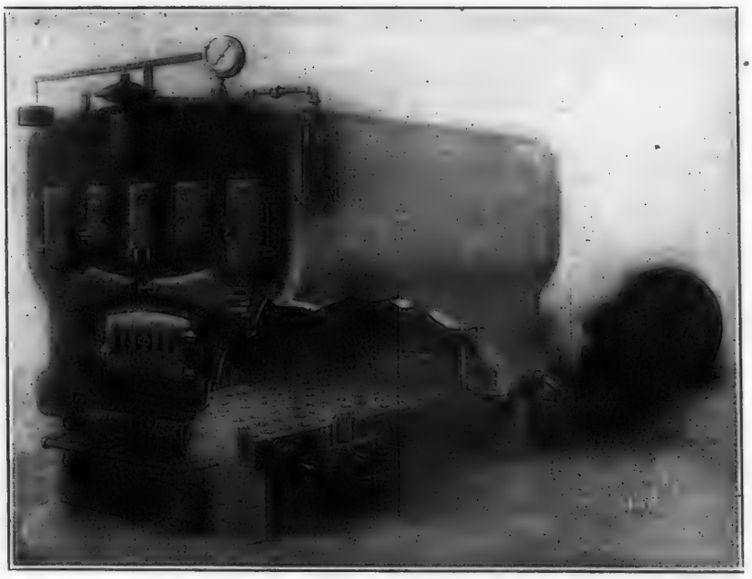


Pyramid Grate
(Pyramid Iron Products Co., New York



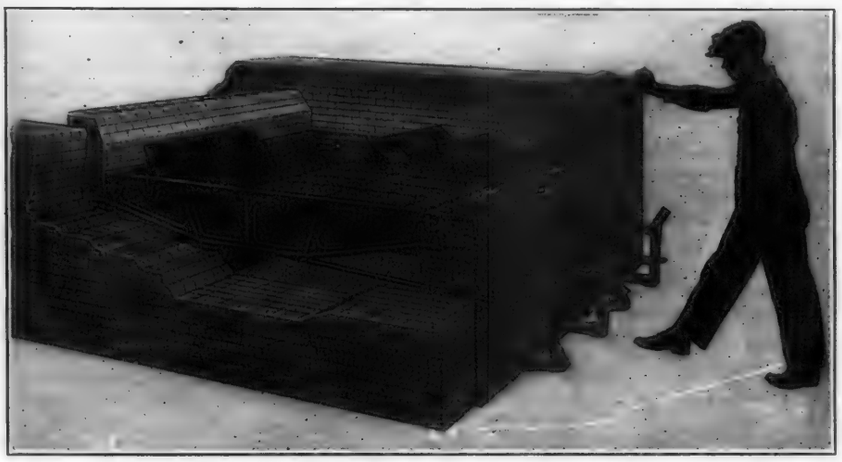
Detail of Culm-Burn Grate

Grates for Burning Small-Sized Anthracite Which Are Figuring Prominently in the Fuel Conservation Program



Culm-Burn Grate
(Wolff & Munier, Inc., New York)

Rathgeb Grate
(Rathgeb Grate Co., Inc., New York)



Thomas Anthra-Dump Grate
(Thomas Grate Bar Co., New York)

INFILTRATION

Stationary Wood Sash	25	French Doors	100
Double Hung Wood Sash	50	Outside Doors	200
Double Hung Steel Sash	100	Outside Doors with Storm Doors	100
Casement Windows	100	Outside Doors with	
Fenestra	100	Inner Vestibule Doors	100

Metal Weather Strip Deducts 50%

HEATING AND PIPING CONTRACTO

STANDARD RADIATION ES

SHOWING RADIATION REQUIRED FO

Copyright 1924, by Heating and Piping Contractors National Association. For Other Construction th

3 Col 38" St'm Rad	GLASS		INFILTRATION				OUTSIDE WALLS															
	Win. or Door	Sky Light	Rate per Lin. Ft.				Plain Brick			Brick and Pl.			Brick Fur. L. P.			Br. 4" Tile Pl.			Plain Conc.			Conc
			25	50	100	200	8"	12"	16"	8"	12"	16"	8"	12"	16"	4"	8"	12"	8"	12"	16"	8"
	1.1	1.3	0.45	0.9	1.8	3.6	.42	.32	.26	.38	.29	.25	.27	.23	.21	.30	.26	.22	60	.48	.41	.50
225	77.0	91.0	31.5	63.0	126	252	29.4	22.4	18.2	26.6	20.3	17.5	18.9	16.1	14.7	21.0	18.2	15.4	42.0	33.6	28.7	35.0
1	2.92	2.47	7.14	3.57	1.79	.89	7.7	10.0	12.4	8.5	11.1	12.9	11.9	14.0	15.3	10.7	12.4	14.6	5.4	6.7	7.8	6.4
2	5.84	4.94	14.3	7.14	3.58	1.78	15.4	20.0	24.8	17.0	22.2	25.8	23.8	28.0	30.6	21.4	24.8	29.2	10.8	13.4	15.6	12.8
3	8.76	7.41	21.4	10.7	5.37	2.67	23.1	30.0	37.2	25.5	33.3	38.7	35.7	42.0	45.9	32.1	37.2	43.8	16.2	20.1	23.4	19.2
4	11.7	9.88	28.6	14.2	7.16	3.56	30.8	40.0	49.6	34.0	44.4	51.6	47.6	56.0	61.2	42.8	49.6	58.4	21.6	26.8	31.2	25.6
5	14.6	12.4	35.7	17.9	8.95	4.45	38.5	50.0	62.0	42.5	55.5	64.5	59.5	70.0	76.5	53.5	62.0	73.0	27.0	33.5	39.0	32.0
6	17.5	14.8	42.8	21.4	10.7	5.34	46.2	60.0	74.4	51.0	66.6	77.4	71.4	84.0	91.8	64.2	74.4	87.6	32.4	40.2	46.8	38.4
7	20.4	17.3	49.9	25.0	12.5	6.23	53.9	70.0	86.8	59.5	77.7	90.3	83.3	98.0	107	74.9	86.8	102	37.8	46.9	54.6	44.8
8	23.4	19.8	57.1	28.6	14.3	7.12	61.6	80.0	99.2	68.0	88.8	103	95.2	112	122	85.6	99.2	117	43.2	53.6	62.4	51.2
9	26.3	22.2	64.3	32.1	16.1	8.01	69.3	90.0	112	76.5	99.9	116	107	126	138	96.3	112	131	48.6	60.3	70.2	57.6
10	29.2	24.7	71.4	35.7	17.9	8.90	77.0	100	124	85.0	111	129	119	140	153	107	124	146	54.0	67.0	78.0	64.0
11	32.1	27.2	78.5	39.3	19.7	9.79	84.7	110	136	93.5	122	142	131	154	168	118	136	161	59.4	73.7	85.8	70.4
12	35.0	29.6	85.7	42.8	21.5	10.7	92.4	120	149	102	133	155	143	168	184	128	149	175	64.8	80.4	93.6	76.8
13	38.0	32.1	92.8	46.4	23.2	11.6	100	130	161	111	144	168	155	182	199	139	161	190	70.2	87.1	101	83.2
14	40.9	34.6	100	50.0	25.1	12.5	108	140	174	119	155	181	167	196	214	150	174	204	75.6	93.8	109	89.6
15	43.8	37.1	107	53.6	26.9	13.4	116	150	186	128	167	194	179	210	230	161	186	219	81.0	101	117	96.0
16	46.7	39.5	114	57.1	28.6	14.2	123	160	198	136	178	206	190	224	245	171	198	234	86.4	107	125	102
17	49.6	42.0	121	60.7	30.4	15.1	131	170	211	145	189	219	202	238	260	182	211	248	91.8	114	133	109
18	52.6	44.5	129	64.3	32.2	16.0	139	180	223	153	200	232	214	252	275	193	223	263	97.2	121	140	115
19	55.5	46.9	136	67.9	34.0	16.9	146	190	236	162	211	245	226	266	291	203	236	277	103	127	148	122
20	58.4	49.4	143	71.4	35.8	17.8	154	200	248	170	222	258	238	280	306	214	248	292	108	134	156	128
21	61.3	51.9	150	75.0	37.6	18.7	162	210	260	179	233	271	250	294	321	225	260	307	113	141	164	134
22	64.2	54.3	157	78.5	39.4	19.6	169	220	273	187	244	284	262	308	337	235	273	321	119	147	172	141
23	67.2	56.8	164	82.1	41.2	20.5	177	230	285	196	255	297	274	322	352	246	285	336	124	154	179	147
24	70.8	59.3	171	85.7	43.0	21.4	185	240	298	204	266	310	286	336	367	257	298	350	130	161	187	154
25	73.0	61.8	179	89.3	44.8	22.3	193	250	310	213	278	323	298	350	383	268	310	365	135	168	195	160

For Methods of Using Table See Back of Sheet.

INFILTRATION

Stationary Wood Sash	25	French Doors	100
Double Hung Wood Sash	50	Outside Doors	200
Double Hung Steel Sash	100	Outside Doors with Storm Doors	100
Casement Windows	100	Outside Doors with	
Fenestra	100	Inner Vestibule Doors	100

Metal Weather Strip Deducts 50%

HEATING AND PIPING CONTRACTO

STANDARD RADIATION ES

SHOWING RADIATION REQUIRED FO

Copyright 1924, by Heating and Piping Contractors National Association. For Other Construction th

3 Col 38" St'm Rad	GLASS		INFILTRATION				OUTSIDE WALLS															
	Win. or Door	Sky Light	Rate per Lin. Ft.				Plain Brick			Brick and Pl.			Brick Fur. L. P.			Br. 4" Tile Pl.			Plain Conc.			Conc
			25	50	100	200	8"	12"	16"	8"	12"	16"	8"	12"	16"	4"	8"	12"	8"	12"	16"	8"
	1.1	1.3	0.45	0.9	1.8	3.6	.42	.32	.26	.38	.29	.25	.27	.23	.21	.30	.26	.22	60	.48	.41	.50
225	60.5	71.5	25.0	50.0	100	200	23.1	17.6	14.3	20.9	16.0	13.8	14.9	12.7	11.6	16.5	14.3	12.1	33.0	26.4	22.6	27.5
1	3.72	3.15	9.0	4.5	2.25	1.125	9.7	12.8	15.7	10.8	14.1	16.3	15.1	17.7	19.4	13 6	15.7	18.6	6.8	8.5	10.0	8.2
2	7.44	6.30	18.0	9.0	4.50	2.25	19.4	25.6	31.4	21.6	28.2	32.6	30.2	35.4	38.8	27.2	31.4	37.2	13.6	17.0	20.0	16.4
3	11.2	9.45	27.0	13.5	6.75	3.38	29.1	38.4	47.1	32.4	42.3	48.9	45.3	53.1	58.2	40.8	47.1	55.8	20.4	25.5	30.0	24.6
4	14.9	12.6	36.0	18.0	9.00	4.50	38.8	51.2	62.8	43.2	56.4	65.2	60.4	70.8	77.6	54.4	62.8	74.4	27.2	34.0	40.0	32.8
5	18.6	15.8	45.0	22.5	11.3	5.63	48.5	64.0	78.5	54.0	70.5	81.5	75.5	88.5	97.0	68.0	78.5	93.0	34.0	42.5	50.0	41.0
6	22.3	18.9	54.0	27.0	13.5	6.75	58.2	76.8	94.2	64.8	84.6	97.8	90.6	106	116	81.6	94.2	112	40.8	51.0	60.0	49.2
7	26.0	22.1	63.0	31.5	15.8	7.88	67.9	89.6	110	75.6	98.7	114	106	124	136	95.2	110	130	47.6	59.5	70.0	57.4
8	29.8	25.2	72.0	36.0	18.0	9.00	77.6	102	126	86.4	113	130	121	142	155	109	126	149	54.4	68.0	80.0	65.6
9	33.5	28.3	81.0	40.5	20.2	10.1	87.3	115	141	97.2	127	147	136	159	175	122	141	167	61.2	76.5	90.0	73.8
10	37.2	31.5	90.0	45.0	22.5	11.3	97.0	128	157	108	141	163	151	177	194	136	157	186	68.0	85.0	100	82.0
11	40.9	34.7	99.0	49.5	24.8	12.4	107	141	173	119	155	179	166	195	213	150	173	205	74.8	93.5	110	90.2
12	44.6	37.9	108	54.0	27.0	13.5	116	154	188	130	169	196	181	212	233	163	188	223	81.6	102	120	98.4
13	48.4	41.0	117	58.5	29.2	14.6	126	166	204	140	183	212	196	230	252	177	204	242	88.4	111	130	107
14	52.1	44.1	126	63.0	31.5	15.8	136	179	220	151	197	228	211	248	272	190	220	260	95.2	119	140	115
15	55.8	47.2	135	67.5	33.7	16.9	146	192	236	162	212	245	227	266	291	204	236	279	102	128	150	123
16	59.5	50.4	144	72.0	36.0	18.0	155	205	251	173	226	261	242	283	310	218	251	298	109	136	160	131
17	63.2	53.5	153	76.5	38.2	19.1	165	218	267	184	240	277	257	301	330	231	267	316	116	145	170	139
18	67.0	56.7	162	81.0	40.5	20.3	175	230	283	194	254	293	272	319	349	245	283	335	122	153	180	148
19	70.7	59.9	171	85.5	42.8	21.4	184	243	298	205	268	310	287	336	369	258	298	353	129	162	190	156
20	74.4	63.0	180	90.0	45.0	22.5	194	256	314	216	282	326	302	354	388	272	314	372	136	170	200	164
21	78.1	66.1	189	94.5	47.2	23.6	204	269	330	227	296	342	317	372	407	286	330	391	143	179	210	172
22	81.8	69.3	198	99.0	49.5	24.8	213	282	345	238	310	359	332	389	427	299	345	409	150	187	220	180
23	85.6	72.4	207	104	51.8	25.9	223	294	361	248	324	375	347	407	446	313	361	428	156	196	230	189
24	89.3	75.7	216	108	54.0	27.0	233	307	377	259	338	391	362	425	466	326	377	446	163	204	240	197
25	93.0	78.8	225	113	56.2	28.1	243	320	393	270	353	408	378	443	485	340	393	465	170	213	250	205

For Methods of Using Table See Back of Sheet. The Heating and Ventilating Magazine's Data

ND PIPING CONTRACTORS NATIONAL ASSO

STANDARD RADIATION ESTIMATING TABLE

SHOWING RADIATION REQUIRED FOR QUANTITIES INDICATED

tractors National Association. For Other Construction than that Shown See Heating and Piping Contractors National

U T S I D E W A L L S															R
L. P.		Br. 4" Tile Pl.			Plain Conc.			Conc. Fur L. P.			Frame Std.	Frame No Sh'g	Frame No L. P.	T&G on 1" Bd.	T&G on 4 Conc
	16"	4"	8"	12"	8"	12"	16"	8"	12"	16"					
	.21	.30	.26	.22	60	.48	.41	.50	.40	.34	.24	31	.35	.30	.6
	14.7	21.0	18.2	15.4	42.0	33.6	28.7	35.0	28.0	23.8	16.8	21.7	24.5	21.0	42.
	15.3	10.7	12.4	14.6	5.4	6.7	7.8	6.4	8.0	9.5	13.4	10.4	9.2	10.7	5.
	30.6	21.4	24.8	29.2	10.8	13.4	15.6	12.8	16.0	19.0	26.8	20.8	18.4	21.4	10.
	45.9	32.1	37.2	43.8	16.2	20.1	23.4	19.2	24.0	28.5	40.2	31.2	27.6	32.1	16.
	61.2	42.8	49.6	58.4	21.6	26.8	31.2	25.6	32.0	38.0	53.6	41.6	36.8	42.8	21.
	76.5	53.5	62.0	73.0	27.0	33.5	39.0	32.0	40.0	47.5	67.0	52.0	46.0	53.5	27.
	91.8	64.2	74.4	87.6	32.4	40.2	46.8	38.4	48.0	57.0	80.4	62.4	55.2	64.2	32.
	107	74.9	86.8	102	37.8	46.9	54.6	44.8	56.0	66.5	93.8	72.8	64.4	74.9	37.
	122	85.6	99.2	117	43.2	53.6	62.4	51.2	64.0	76.0	107	83.2	73.6	85.6	43.
	138	96.3	112	131	48.6	60.3	70.2	57.6	72.0	85.5	121	93.6	82.8	96.3	48.
	153	107	124	146	54.0	67.0	78.0	64.0	80.0	95.0	134	104	92.0	107	54.
	168	118	136	161	59.4	73.7	85.8	70.4	88.0	105	147	114	101	118	59.
	184	128	149	175	64.8	80.4	93.6	76.8	96.0	114	161	125	110	128	64.
	199	139	161	190	70.2	87.1	101	83.2	104	124	174	135	120	139	70.
	214	150	174	204	75.6	93.8	109	89.6	112	133	188	146	129	150	75.
	230	161	186	219	81.0	101	117	96.0	120	143	201	156	138	161	81.
	245	171	198	234	86.4	107	125	102	128	152	214	166	147	171	86.
	260	182	211	248	91.8	114	133	109	136	162	228	177	156	182	91.
	275	193	223	263	97.2	121	140	115	144	171	241	187	166	193	97.
	291	203	236	277	103	127	148	122	152	181	255	198	175	203	10
	306	214	248	292	108	134	156	128	160	190	268	208	184	214	10
	321	225	260	307	113	141	164	134	168	200	281	218	193	225	11
	337	235	273	321	119	147	172	141	176	209	295	229	202	235	11
	352	246	285	336	124	154	179	147	184	219	308	239	212	246	12
	367	257	298	350	130	161	187	154	192	228	322	250	221	257	13
	383	268	310	365	135	168	195	160	200	238	355	260	230	268	13

AND PIPING CONTRACTORS NATIONAL ASSO

STANDARD RADIATION ESTIMATING TABLE

SHOWING RADIATION REQUIRED FOR QUANTITIES INDICATED

ntractors National Association. For Other Construction than that Shown See Heating and Piping Contractors Nationa

U T S I D E W A L L S															F
r. L. P.		Br. 4" Tile Pl.			Plain Conc.			Conc. Fur L. P.			Frame Std.	Frame No Sh'g	Frame No L. P.	T&G on 1" Bd.	T& on Co
"	16"	4"	8"	12"	8"	12"	16"	8"	12"	16"					
3	21	.30	.26	.22	60	.48	.41	.50	.40	.34	.24	.31	.35	.30	
.7	11.6	16.5	14.3	12.1	33.0	26.4	22.6	27.5	22.0	18.7	13.2	17.1	19.3	16.5	33
.7	19.4	13 6	15.7	18.6	6.8	8.5	10.0	8.2	10.2	12.0	17.0	13.2	11.7	13.6	6
.4	38.8	27.2	31.4	37.2	13.6	17.0	20.0	16.4	20.4	24.0	34.0	26.4	23.4	27.2	13
.1	58.2	40.8	47.1	55.8	20.4	25.5	30.0	24.6	30.6	36.0	51.0	39.6	35.1	40.8	20
.8	77.6	54.4	62.8	74.4	27.2	34.0	40.0	32.8	40.8	48.0	68.0	52.8	46.8	54.4	27
.5	97.0	68.0	78.5	93.0	34.0	42.5	50.0	41.0	51.0	60.0	85.0	66.0	58.5	68.0	34
06	116	81.6	94.2	112	40.8	51.0	60.0	49.2	61.2	72.0	102	79.2	70.2	81.6	40
24	136	95.2	110	130	47.6	59.5	70.0	57.4	71.4	84.0	119	92.4	81.9	95.2	47
42	155	109	126	149	54.4	68.0	80.0	65.6	81.6	96.0	136	106	93.6	109	54
59	175	122	141	167	61.2	76.5	90.0	73.8	91.8	108	153	119	105	122	61
77	194	136	157	186	68.0	85.0	100	82.0	102	120	170	132	117	136	68
95	213	150	173	205	74.8	93.5	110	90.2	112	132	187	145	129	150	74
12	233	163	188	223	81.6	102	120	98.4	122	144	204	158	140	163	81
30	252	177	204	242	88.4	111	130	107	133	156	221	172	152	177	88
48	272	190	220	260	95.2	119	140	115	143	168	238	185	164	190	95
266	291	204	236	279	102	128	150	123	153	180	255	198	176	204	
283	310	218	251	298	109	136	160	131	163	192	272	211	187	218	
301	330	231	267	316	116	145	170	139	173	204	289	224	199	231	
319	349	245	283	335	122	153	180	148	184	216	306	238	211	245	
336	369	258	298	353	129	162	190	156	194	228	323	251	222	258	
354	388	272	314	372	136	170	200	164	204	240	340	264	234	272	
372	407	286	330	391	143	179	210	172	214	252	357	277	246	286	
389	427	299	345	409	150	187	220	180	224	264	374	290	257	299	
407	446	313	361	428	156	196	230	189	235	276	391	304	269	313	
425	466	326	377	446	163	204	240	197	245	288	408	317	281	326	
443	485	340	393	465	170	213	250	205	255	300	425	330	293	340	

ting and Ventilating Magazine's Data Sheets Nos. 13 Q 2 and 13 F

CIATION

l Association Engineering Standards.

BUFFALO

TEMPERATURE FACTORS	
Room Temperature	70°=T_1
Base Temperature	0°=T_o
Base Temp. 0° Equivalent to Guarantee Temp. —15° Outside	

EXPOSURE FACTORS			
N	1.00	S	1.25
NE	1.00	SW	1.40
E	1.00	W	1.40
SE	1.00	NW	1.40

OOF			Base Floor		Interm'e Floor			Ceiling		Partition			Type
G 4" nc.	Sh'gle on Sh'g	Sh'gle Sh'g L. P.	Conc. on Earth	Wood on Sleep.	4" Conc.	4" Conc. 3" Fill 1" Fin.	Double Wood	Lath and Plas.	L & P Wo. Fl. Over	Stud L & P 1 Side	Stud L & P 2 Side		Kind
													Thick.
60	.40	.30	.31	.13	.20	.15	.20	.49	.28	.60	.33		K
.0	28.0	21.0	10.9	4.55	7.0	5.25	7.0	17.2	9.8	21.0	11.6		K(T₁-T₀)
.4	8.0	10.7	20.7	49.5	32.2	42.9	32.2	13.1	23.0	10.7	19.4		1
.8	16.0	21.4	41.4	99.0	64.4	85.8	64.4	26.2	46.0	21.4	38.8		2
.2	24.0	32.1	62.1	149	96.6	129	96.6	39.3	69.0	32.1	58.2		3
.6	32.0	42.8	82.8	198	129	172	129	52.4	92.0	42.8	77.6		4
.0	40.0	53.5	104	248	161	215	161	65.5	115	53.5	97.0		5
.4	48.0	64.2	124	297	193	257	193	78.6	138	64.2	116		6
.8	56.0	74.9	145	347	225	300	225	91.7	161	74.9	136		7
.2	64.0	85.6	166	396	258	343	258	105	184	85.6	155		8
.6	72.0	96.3	186	446	290	386	290	118	207	96.3	175		9
.0	80.0	107	207	495	322	429	322	131	230	107	194		10
.4	88.0	118	228	545	354	472	354	144	253	118	213		11
.8	96.0	128	248	594	386	515	386	157	276	128	233		12
.2	104	139	269	644	419	558	419	170	299	139	252		13
.6	112	150	290	693	451	601	451	183	322	150	272		14
.0	120	161	311	743	483	644	483	196	345	161	291		15
.4	128	171	331	792	515	686	515	209	368	171	310		16
.8	136	182	352	842	547	729	547	223	391	182	330		17
.2	144	193	373	891	580	772	580	236	414	193	349		18
03	152	203	393	941	612	815	612	249	437	203	369		19
08	160	214	414	990	644	858	644	262	460	214	388		20
13	168	225	435	1040	676	901	676	275	483	225	407		21
19	176	235	455	1089	708	944	708	288	506	235	427		22
24	184	246	476	1139	741	987	741	301	529	246	446		23
30	192	257	497	1188	773	1030	773	314	552	257	466		24
35	200	268	518	1238	805	1073	805	327	575	268	485		25

← These Items Figured on Basis of K $\left(\frac{T_1-T_2}{2}\right)$ →

OCIATION

nal Association Engineering Standards.

KANSAS CITY

TEMPERATURE FACTORS	
Room Temperature	70°=T_1
Base Temperature	+15°=T_o
Base Temp. +15° Equivalent to Guarantee Temp. of 0° Outside	

EXPOSURE FACTORS			
N	1.45	S	1.10
NE	1.35	SW	1.10
E	1.00	W	1.45
SE	1.00	NW	1.45

ROOF			Base Floor		Interm'e Floor			Ceiling		Partition			Type
&G n 4" Conc.	Sh'gle on Sh'g	Sh'gle Sh'g L. P.	Conc. on Earth	Wood on Sleep.	4" Conc.	4" Conc. 3" Fill 1" Fin.	Double Wood	Lath and Plas.	L & P Wo. Fl. Over	Stud L & P 1 Side	Stud L & P 2 Side		Kind
													Thick.
.60	.40	.30	.31	.13	.20	.15	.20	.49	.28	.60	.33		K
3.0	22.0	16.5	8.55	3.58	5.5	4.13	5.5	13.5	7.7	16.5	9.08		K(T₁-T₀)
6.8	10.2	13.6	26.3	62.9	40.9	54.5	40.9	16.7	29.2	13.6	24.8		1
3.6	20.4	27.2	52.6	126	81.8	109	81.8	33.4	58.4	27.2	49.6		2
0.4	30.6	40.8	78.9	189	123	164	123	50.1	87.6	40.8	74.4		3
7.2	40.8	54.4	105	252	164	218	164	66.8	117	54.4	99.2		4
4.0	51.0	68.0	132	315	205	273	205	83.5	146	68.0	124		5
0.8	61.2	81.6	158	377	245	327	245	100	175	81.6	149		6
7.6	71.4	95.2	184	440	286	382	286	117	204	95.2	174		7
4.4	81.6	109	210	503	327	436	327	134	234	109	198		8
1.2	91.8	122	237	566	368	491	368	150	263	122	223		9
8.0	102	136	263	629	409	545	409	167	292	136	248		10
4.8	112	150	289	692	450	600	450	184	321	150	273		11
1.6	122	163	316	755	491	654	491	200	350	163	298		12
8.4	133	177	342	818	532	709	532	217	380	177	322		13
5.2	143	190	368	886	573	763	573	234	409	190	347		14
102	153	204	395	944	614	818	614	251	438	204	372		15
109	163	218	421	1006	654	872	654	267	467	218	397		16
116	173	231	447	1069	695	927	695	284	496	231	422		17
122	184	245	473	1132	736	981	736	301	526	245	446		18
129	194	258	498	1195	771	1036	771	317	555	258	471		19
136	204	272	526	1258	818	1090	818	334	584	272	496		20
143	214	286	552	1321	859	1145	859	351	613	286	521		21
150	224	299	579	1384	900	1199	900	367	642	299	546		22
156	235	313	605	1447	941	1254	941	384	672	313	570		23
163	245	326	631	1510	982	1308	982	401	701	326	595		24
170	255	340	658	1573	1023	1363	1023	418	730	340	620		25

R 2

←— These Items Figured on Basis of K $\left(\frac{T_1-T_2}{2}\right)$ —→

How to Use the Buffalo Table

Figure from the plans the number of square feet of wall, glass and lineal feet of crack for each exposure. Find the nearest corresponding quantity in appropriate column. Then read horizontally to extreme right or left-hand column for square feet of radiation required. Add additional amount for exposure, as shown in upper right-hand square of data sheet.

For example, for Buffalo, N. Y.: 70 sq. ft. 12-in. brick wall. Read down the column headed "Plain brick, 12-in."; the corresponding figure in the table is 70. Following horizontally to extreme left or right shows 7 sq. ft. of 38-in. 3-col. radiation. If wall faces north, multiply by 1.00, making 7 sq. ft. actually required.

If the same wall has 30 sq. ft. of glass or door, the nearest corresponding figure under "Glass" is 29.2, or 10 sq. ft. This figure multiplied by exposure factor, 1.00, equals 10 sq. ft. If window has 39 lin. ft. of crack and is double-hung wood sash, without weather strips, the corresponding figure in the table (using the column headed "50" under "Infiltration") is 39.3 or 11 sq. ft. of radiation. Multiplying by 1.00 for exposure equals 11 sq. ft. of radiation.

The three quantities of radiation—7, 10 and 11—equal 28 sq. ft. as the total amount of radiation required for this exposure. The three quantities for any one exposure can be added together and then multiplied by the exposure factor to obtain the same result. No exposure factor is to be used for roofs, floors, ceilings, or partitions or skylights, unless skylights are vertical or practically vertical.

The factor in the last column is the number of B.T.U. per lineal foot of crack per hour per degree difference in temperature.

How to Use the Kansas City Table

Figure from the plans the number of square feet of wall, glass and lineal feet of crack for each exposure. Find the nearest corresponding quantity in appropriate column. Then read horizontally to extreme right or left-hand column for square feet of radiation required. Add additional amount for exposure, as shown in upper right-hand square of data sheet.

For example, for Kansas City: 70 sq. ft. of 12-in. brick wall. Read down the column headed "Plain brick 12-in."; the figure in the table falls between 64.0 and 76.8. Following horizontally to extreme left or right shows 5.5 sq. ft. of 38-in. 3-col. radiation. If wall faces north, multiply by 1.45, making 8.0 sq. ft. actually required.

If same wall has 30 sq. ft. of glass or door, the nearest corresponding figure under "Glass" is 29.8 or 8 sq. ft. This figure multiplied by exposure factor, 1.45, equals 11.6 sq. ft. If window has 39 lin. ft. and is double-hung wood sash, without weather strips, the nearest corresponding figure in the table (using the column headed "50" under "Infiltration") is 40.5, or the equivalent of 9 sq. ft. of radiation. Multiplying by 1.45 for exposure equals 13.05 sq. ft. of radiation.

The three quantities—8.0, 11.6 and 13.0—equal 32.6 or, for simplicity, 33 sq. ft. as the total amount of radiation required for this exposure. The three quantities for any one exposure can be added together and then multiplied by the exposure factor to obtain the same result. No exposure factor is to be used for roofs, floors, ceilings, or partitions or skylights, unless skylights are vertical or practically vertical.

The factor in the last column is the number of B.T.U. per lineal foot of crack per hour per degree difference in temperature.

Advertising Budget for Heating Contractors

It is well known that many heating contractors and master plumbers spend a good deal of money for space in various kinds of worthless mediums. In an effort to remedy this condition, the National Trade Extension Bureau is offering to make out a budget and show how much should be spent for all forms of advertising and how much should be spent for each particular kind, based upon the special conditions of the business. The budget is based upon the contractor's previous year's sales volume.

Based upon the special conditions of the business, particulars are also available regarding the value of each kind of advertising suggested, with detailed information on how to use it to secure the best results.

When newspaper advertising is suggested, the Bureau will furnish suggestions for copy in the form of proof sheets each month. If sales letters are suggested, the Bureau will furnish a number of sample sales letters and is prepared to send detailed information on how to compile and use a mailing list and how to use mail advertising. In order to secure the necessary information upon which to base its suggestions, the Bureau has prepared a questionnaire form which may be had at the Bureau headquarters.

Actual donations for advertising are given by the bureau as follows:

Annual Volume of Business	Advertising and Donations
$7,500	$110
10,000	150
15,000	225
20,000	285
25,000	325
35,000	375
50,000	450
75,000	600
100,000	750
150,000	900
200,000	1,050
250,000	1,200

A. S. M. E. San Francisco Meeting

A registered attendance of 547 members and guests was reported at the San Francisco Spring meeting of the American Society of Mechanical Engineers, June 28-July 1. This made it the largest meeting of the society ever held on the Pacific Coast. Kansas City was selected as the place for the regional meeting during April, 1927, and White Sulphur Springs, for the Spring meeting during May, 1927.

Secretary Calvin S. Rice made a report on his recent visit to Europe as a representative of the Museum of the Peaceful Arts of New York, during which he called on representatives of engineering societies throughout Europe and carried out a number of missions of immediate import to the American engineering profession.

More Data on Fuel Saving with Unit Thermostatic Control

FIGURES taken from steam companies' records in a number of cities covering buildings under thermostatic control confirm the previous data published in these columns as to the actual savings that are possible, not only when temperature regulation is applied to various parts of the building, but also through the use of unit thermostatic control, applied to a single typical room.

The buildings in question range from 5 to 18 stories high and represent almost every class of office building to be found in a downtown business district. They are of a type which, until within recent years, has not been considered adaptable to satisfactory control, with any reasonable degree of economy, through the use of a single thermostat.

The buildings, cities and summary results follow:

Fife Building, Detroit

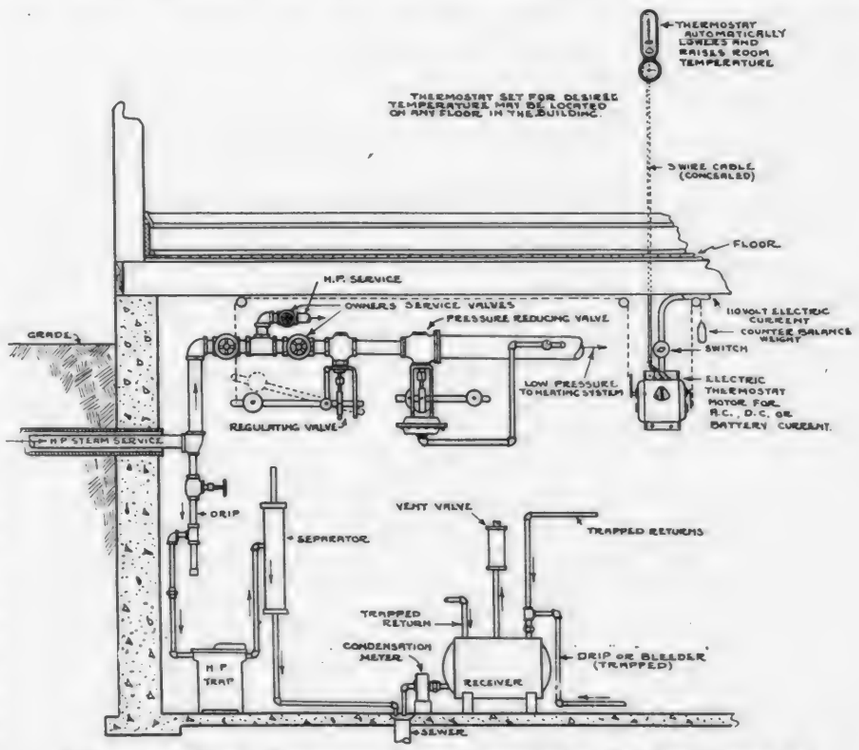
This is a modern 15-story office building on Woodward Ave., Detroit. In this building, a check-up of the records of the owner, as well as those of the Detroit Edison Company, which furnishes the building with steam, shows a saving of slightly over $700 during the past heating season.

Fife Building, Detroit

Puget Sound Power & Light Co. Building, Seattle, Wash.

The chart reproduced on page 100 shows the results secured in the Puget Sound Power Company's own office building, which contains 3290 sq. ft. of radiation.

The estimated steam consumption for the six months, which are from October to March, inclusive, was 4,235,000 lbs. Through careful hand regulation of temperature, the actual consumption



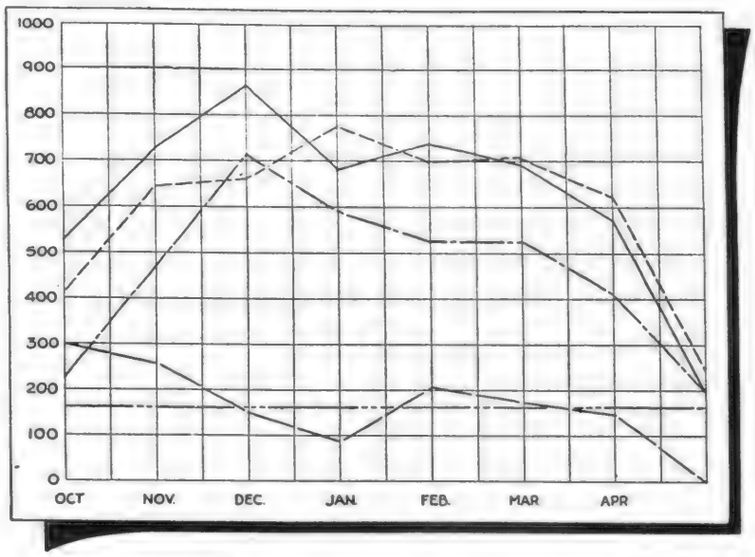
Minneapolis Unit Thermostat Control Installed in Building Heated by High-Pressure Central Station Steam

was brought down to 3,919,000 lbs. during a corresponding six months period.

After the unit thermostatic control method was adopted, a further test was made during 1924-25. The six months' consumption during that season was reduced to 3,044,000 lbs., equivalent to a saving of 28.15% over hand regulation.

One of the factors which is lending so much interest to unit control is the fact that the price of installing this class of control in buildings already constructed is prohibitive, as the cost would be out of all proportion to the amount of saving made and, unless taken from the standpoint of comfort and not of economy, could not be considered.

The need of some automatic control which can be installed at moderate cost and small upkeep, operating as a limiting device on the main control valve, shutting the heat off when the desired temperature is reached and turning it on when the temperature is dropped one or two degrees, is the most logical, and from tests taken over a period of years shows some surprising results both from the efficiency and economical standpoints.



Operating Records, Office Building of Puget Sound Power & Light Company

Security Building, St. Louis

Building Group Heating in St. Louis

An interesting development in small home construction is being carried out by Charles Truitt, in the grouping of four homes as a unit, with its own central heating plant and service quarters. The first of these groups is being built by Mr. Truitt on Elmore Avenue, in St. Louis County. This type of construction has been used successfully in California and the architects, Manske & Bartling, have worked along the idea of the California style. The houses will be constructed in the English cottage type, combination stucco and matt brick exterior. The windows will be English steel cottage casement.

Fair Store, Indianapolis

COMPARATIVE RESULTS OF MANUAL AND UNIT THERMOSTATIC CONTROL IN TWO COMMERCIAL BUILDINGS

The Fair Store, Indianapolis, Ind.

Dec. '24	Jan. '25	Feb. '25	3 months savings
	With manual control.		
$659.96	$512.73	$408.36	$636.48
	With unit control.		
Dec. '25	Jan. '26	Feb. '26	
$319.80	$312.45	$312.32	

Security Building, St. Louis, Mo.

20,119 sq. ft. of radiation.

Dec. '24	Jan. '25	Feb. '25	Savings:
	With manual control.		
2,317,000 lbs.	2,064,000	1,310,000	Dec. 832,000—35 plus %
	With unit control.		Jan. 691,000—33 plus %
Dec. '25	Jan. '26	Feb. '26	Feb. 290,000—
1,485,000 lbs.	1,373,000	1,020,000	22 plus %

Honeywell Type A Masterstat Listed by Underwriters

Announcement is made by the Honeywell Heating Specialties Co., Wabash, Ind., that the Honeywell Type A masterstat has been accepted and listed as standard by the Underwriters' Laboratories, under date of June 23, 1926. In its report of this device, the Underwriters' Laboratories state:

"This device is positive in operation, sensitive in response to changes in temperature or steam pressure, and reduces to a minimum the possibility of firing into a dry boiler, or of creating excessive pressure or temperature in the boiler to be controlled."

Survey of Business Conditions

According to the monthly survey of business conditions, made by the National Trade Extension Bureau and compiled up to July 31, the improvement in business increased slightly as compared with the previous month. An equally good report was made as to the outlook for the heating business during the succeeding months.

Correspondence

Conducted by T. W. Reynolds

Elimination of the Steam-Type Radiator

EDITOR HEATING AND VENTILATING MAGAZINE:

In the June issue I was interested in the letter by Mr. Longwell on the elimination of the steam-type radiator. It seems strange that an officer of a corporation manufacturing radiators should be unaware that not so many years ago one of the leading manufacturers of radiators published an exhaustive report by a prominent consulting engineer of comparative tests on radiators of steam and hot-water types when used for steam, in which the results were summarized as follows: "The results therefore, demonstrate conclusively the superiority of the 'Steam' radiator over the 'Hot Water' type for steam service."

As there have been but slight changes in radiator patterns since that time, the change in opinion cannot be attributed to change in pattern. In the correspondence files of the Committee on Radiation of the A.S.H. & V.E. are many letters, some from prominent engineers, one from a past president of the society, which express very emphatic opinions in favor of the steam-type radiator.

Furthermore, as was stated in the report of the committee, the research was undertaken at the request of the board of directors of the Heating and Piping Contractors National Association, so that it is apparent in some quarters at least, there is a feeling that the research served its purpose.

Norristown, Pa. R. V. FROST.

Water Heating Systems and their Troubles

EDITOR HEATING AND VENTILATING MAGAZINE:

In connection with the inquiry in your March, 1926, issue, in which your correspondent reported that he was having trouble in getting circulation to the three ends of his heating system marked A, B and C in the accompanying sketch. It appears to me that his trouble is due to the fact that the flow is reversed in the return pipe and he thus obtains a plus or minus flow, due to the varying temperature of the water reaching the return and cutting off the last radiators. If he will take the ends of the supply and the return pipe at A, B, C, connect them together and run a separate line, 1¼ in. back to the boiler, he will find the solution of his trouble. He can run C under the stair well. This can be done at little expense.

Detroit, Mich. I. N. E.

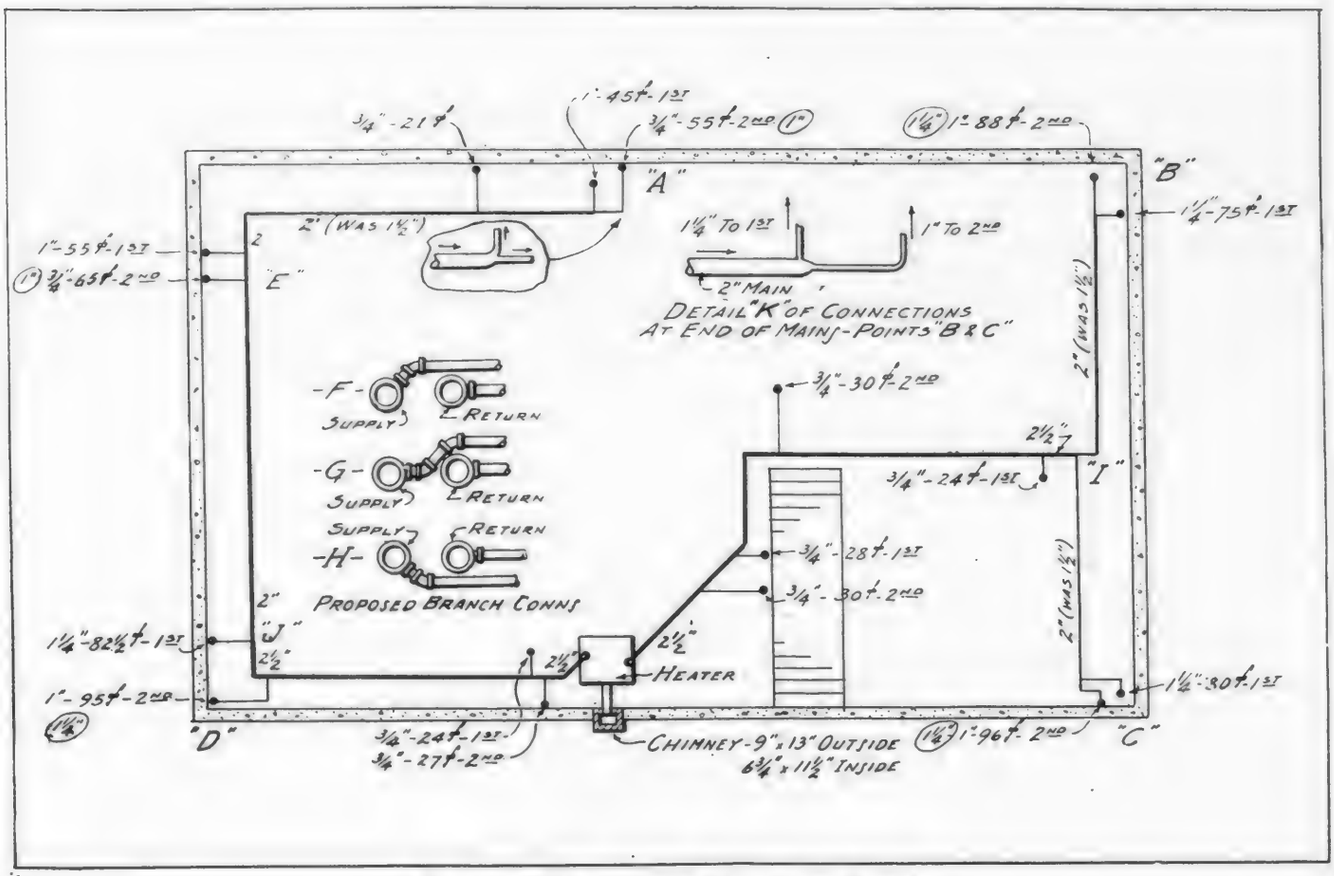
Steel Water-Tube Boilers for Steam Heating

EDITOR HEATING AND VENTILATING MAGAZINE:

Do you know of any concern manufacturing a low-pressure steam heating boiler of the water-tube type? I do not have reference to some of the cast-iron sectional low-pressure types of boilers that are commonly termed "water-tube boilers," but to the type where regular tubing might be used for the heating surfaces. Kindly give me your opinion of such a type of boiler, as compared to boilers of the cast-iron sectional type, for efficiency, rapidity of steam generation, economical fuel consumption and cost of upkeep.

Shickshinny, Pa. J. BOYD ANDERSON.

There has been little demand, comparatively, for a steel water-tube boiler in strictly heating work, not only because of the difficulty in getting such a boiler in a size small enough to go



Design of Water Heating Which Gave Trouble
(Reproduced from March, 1926, issue)

through a 30-in. door, but also because the normal characteristics of this type of boiler are such that it does not readily lend itself to heating conditions. Considerable efficiency is shown at high overloads, the higher the better, and high overloads can be more readily carried, but this is more a requirement of power work than of heating.

Rapid generation of steam is not so essential in heating systems, and is particularly undesirable in such systems if it causes water to be lifted and carried over into the system where it will interfere with circulation to the radiators. As this rapidity of steam generation is mainly in the front of the water-tube boiler, it is important that the front water passages be made of ample size. The amount of disengagement surface, as well as the size, number, and arrangement of steam outlets and their distance above the water-line are all matters of major importance. A good steam separator is another desirable feature where lifting conditions are quite probable.

Rapid steam generation can also be obtained in combination fire and water-tube boilers now on the market for low-pressure heating. To cite one case, the circulation was so rapid that the water-line could not be read in the glass water gauge. This, at first thought, indicated priming, but when the cast-iron water column was installed—this had been omitted—the water circulated through the water column gauge and the water-line indicated became normal.

Small water content is generally an inherent feature of a water-tube boiler and this is undesirable when applied to heating where the water may leave the boiler by steam or return, or be retarded in its flow back to the boiler.

All water tubes are rigid between water legs and massed where most of the heating takes place, which is in the firebox, and this may give expansion and contraction stresses at tube ends. There are many handhole plates to keep tight and retubing is real labor, requiring a better grade of help than the average novice who may tinker around a heating boiler. Water-tube boilers are also expensive to build.

Figuring Infiltration Through Windows

EDITOR HEATING AND VENTILATING MAGAZINE:

Regarding the data tables of the Heating and Piping Contractors National Association which THE HEATING AND VENTILATING MAGAZINE is now publishing, will you please tell me what constitutes a crack in the enclosed window sketches and the values to apply to each crack, some of which are at fixed portions of the windows and others at the movable points? Please list lineal feet of crack, movable and fixed, and corresponding values for each sketch.

I understand that in the case of Figs. 2 and 3 there is no allowance made for the crack each side of the ribs enclosing glass panels, as at points A and B. If so, then why should there be any infiltration loss to figure at similar fixed points such as those along the out-

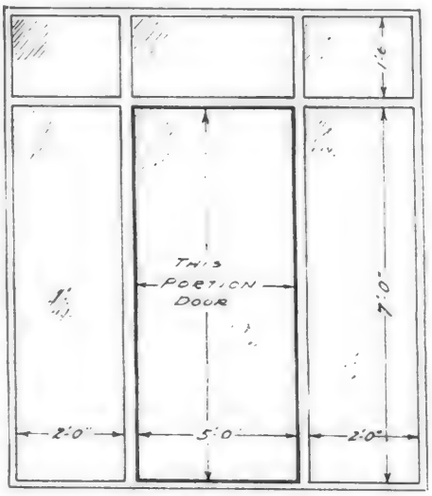


Fig. 1

Door portion (movable) 20 lin. ft. crack @ 200 C.F. infiltration. Balance fixed glass, 59 lin. ft. crack @ 25 C.F. infiltration.

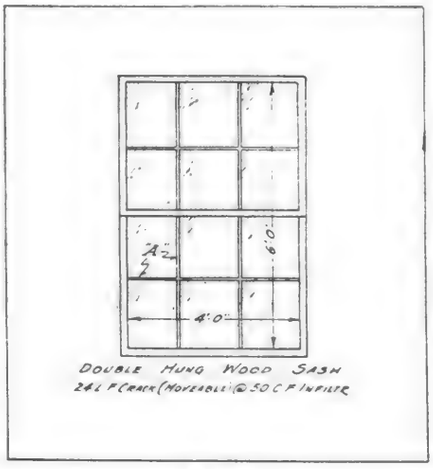


Fig. 2

side boundary of the store window shown in Fig. 4? I would also appreciate your advice as to what allowance is made, if any, for a lessened amount of infiltration when the room is comparatively narrow and exposed on three sides.

New York. R. W. T.

The allowance in cubic feet of air infiltration made for each lineal foot of crack is 200 for an outside door without vestibule or without weather stripping, 100 for double-hung steel sash, 50 for double-hung wood sash, and 25 for stationary wood sash. The application of these values and the lineal feet of crack for each value are given on the sketches. As will be seen thereon, cracks at movable portions of the windows pass more air.

No infiltration is figured at such points as A or B, though it must be taken into account for similar fixed points in Fig. 4, for the reason that the large area of glass shown in this sketch would be more easily affected by expansion and contraction, causing, in this way, cracks of much greater magnitude than the small areas of the panels in Figs. 2 and 3.

When a room is comparatively narrow, or even when it is not narrow and there are three or more exposures, 25% of the total crack may be deducted,—this is according to a late decision of the Standardization Committee of the Heating and Piping Contractors National Association.

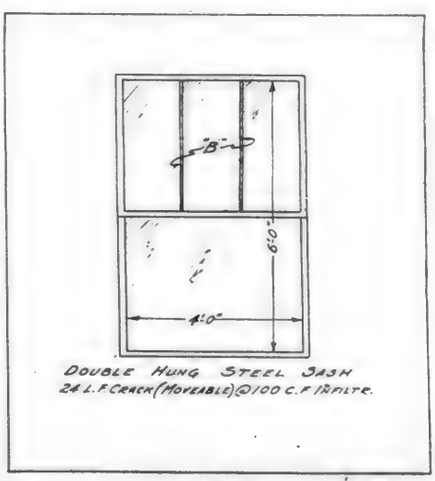


Fig. 3

The H. & P. C. N. A. Radiation Formula

EDITOR HEATING AND VENTILATING MAGAZINE:

The data and Standard Radiation Estimating Tables, sponsored by the Heating and Piping Contractors National Association and published in recent issues of your magazine are very interesting and certainly commendable in that the obvious aim is to secure a "tailor-made fit" in the matter of radiation.

We have all seen so many "blanket

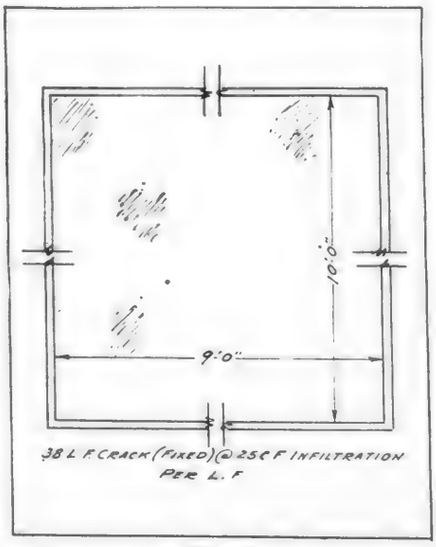


Fig. 4

fits," so much "junk" in the shape of wholly unnecessary excess of radiation, figured by erratic and misleading formulas, that a move in the other direction should be hailed with joy by purchasers, though perhaps not by manufacturers and sellers, of radiation.

But I have a fear that this "fit" is going to prove, in some cases, just a little too tight. The recommendation to use 55° in Boston (for instance) instead of the regular 70°, as the difference between inside and outside temperatures, for ordinary work, while there may be good theoretical reasons for it, will, I suspect, prove too drastic in practice.

An allowance for "infiltration", based on linear feet of window joints, is surely much more correct than the use of the cubic capacity of a room, in any way, as a factor in such computations. But is it the whole story? Is there not also infiltration through a brick wall, —even though it be furred and plastered?

In this connection a simple formula, evolved, probably more than 30 years ago, by the late Professor S. Homer Woodbridge, may be of interest. It is:—

$$\frac{\text{Glass} \times K\ (T_1 - T_0) \text{ plus Wall} \times K\ (T_1 - T_0) \text{ plus \% for exp. plus } 40\%}{\text{output of rad. in B.T.U. per sq. ft. per hour}}$$

Additions, of course, for cold floors and ceilings, if any. Ordinarily, $T_1 - T_0 = 70°$. The exposure factors used were: North 35%, west 25%, east 15% and south 0. The 40% addition is an allowance for "leakage." Just how this was arrived at, I do not know, but I am very sure it has a sound basis and was not just guesswork. I have found this formula to work out very satisfactorily for the last 25 years or more.

As an interesting comparison of these two formulae, assume the case of a plain brick wall, 200 sq. ft. area, southern exposure, no glass, in Boston. According to the H. & P.C.N.A. formula, this calls for 16 sq. ft. and according to S.H.W., 27¾ sq. ft. I should not feel that I was squandering money for unnecessary radiation if I put in 28 sq. ft.

Boston, Mass. P. N. KENWAY.

Cleaning Coils of Domestic Water Heaters

EDITOR HEATING AND VENTILATING MAGAZINE:

I have four Humphrey hot water heaters in my building, and I have reason to believe that the coils are getting clogged with lime incrustations. These coils are about ½ in. inside diameter and I think they are copper. Have you a formula for cleaning these coils, or can you direct me so that I can get such a formula?

Astoria, L. I. M. FLANAGAN.

Certain boiler liquids can be purchased at slight expense and put in without skilled labor in a very short time and without even going to the trouble of emptying the system. Sometimes caustic soda is used and in some cases probably the best way of solving such a nuisance once and for all is to install a so-called silicate chamber for treating the water.

Draining Boiler at End of Heating Season

EDITOR HEATING AND VENTILATING MAGAZINE:

We have a water heating plant in a five-story building and we drained the water out of the system after the last fire in the furnace. Is it correct to leave the system empty or to keep it filled while not in use?

New Rochelle, N. Y. M. E. SHEAR.

For a long time there has been a difference of opinion and practice in regard to laying up a boiler for the summer. Not even the manufacturers of boilers agree on this question and until someone runs a corrosion test for a period of, say, twenty years, nothing conclusive can be given on the subject.

Some owners empty their boiler for the same reason that they would not leave a razor wet, but a water heating system from which the air has been gradually reduced in amount throughout the heating season has very little air left in it, which is one of the arguments advanced for leaving the old water in and not admitting fresh water with its air to take the place of the old air freed water. For example, a domestic hot water service system passes a lot of water and is very much subject to corrosion, whereas an examination of piping removed from water heating systems seldom discloses any appreciable amount of corrosion. Nevertheless, corrosion is such a "bugaboo" to some that if they do empty the boiler they refill it at once in order to exclude the air from the inside of the boiler and piping system and so prevent corrosion, in some cases even cistern or rain water being used for the refill.

If the water used is clean and free from mineral and vegetable matter, it should not be necessary to empty the system more often than once in two or three years, or even longer, but should the water contain impurities of any kind the system should be drained. The presence of oil containing fatty acids which will decompose will cause pitting wherever the sludge can find a resting place.

Pressure water heating systems having the expansion tank in the basement should be emptied at least just before starting the fire in the fall and should not be refilled for at least 24 hours. The tanks of such systems, though tightly made, are liable to become waterlogged after a period of ten months so that the above recommendation is made to insure replenishing of the air in the tank. The same method should be followed in pressure systems without a tank as the new water contains more air, thus giving an additional factor of safety over that afforded by the relief valve, because of the air cushion against which the water can expand as it is heated.

Steel tubular boilers are customarily drained and left dry during the non-heating season, in fact this practice is recommended by the underwriters of boiler insurance. Cast-iron boilers, of course, are not as susceptible to rusting as steel boilers, though cast-iron boilers, put together with screw nipples, will rust out first at the nipples.

When a steel fire-tube boiler* is laid up for the summer months, the manhole and handhole plates and all plug openings should be left wide open so that there may be a free circulation of air through all parts of the boiler. When this is done the interior will dry out without much, if any, application of heat. All air valves in the radiators should also be left wide open.

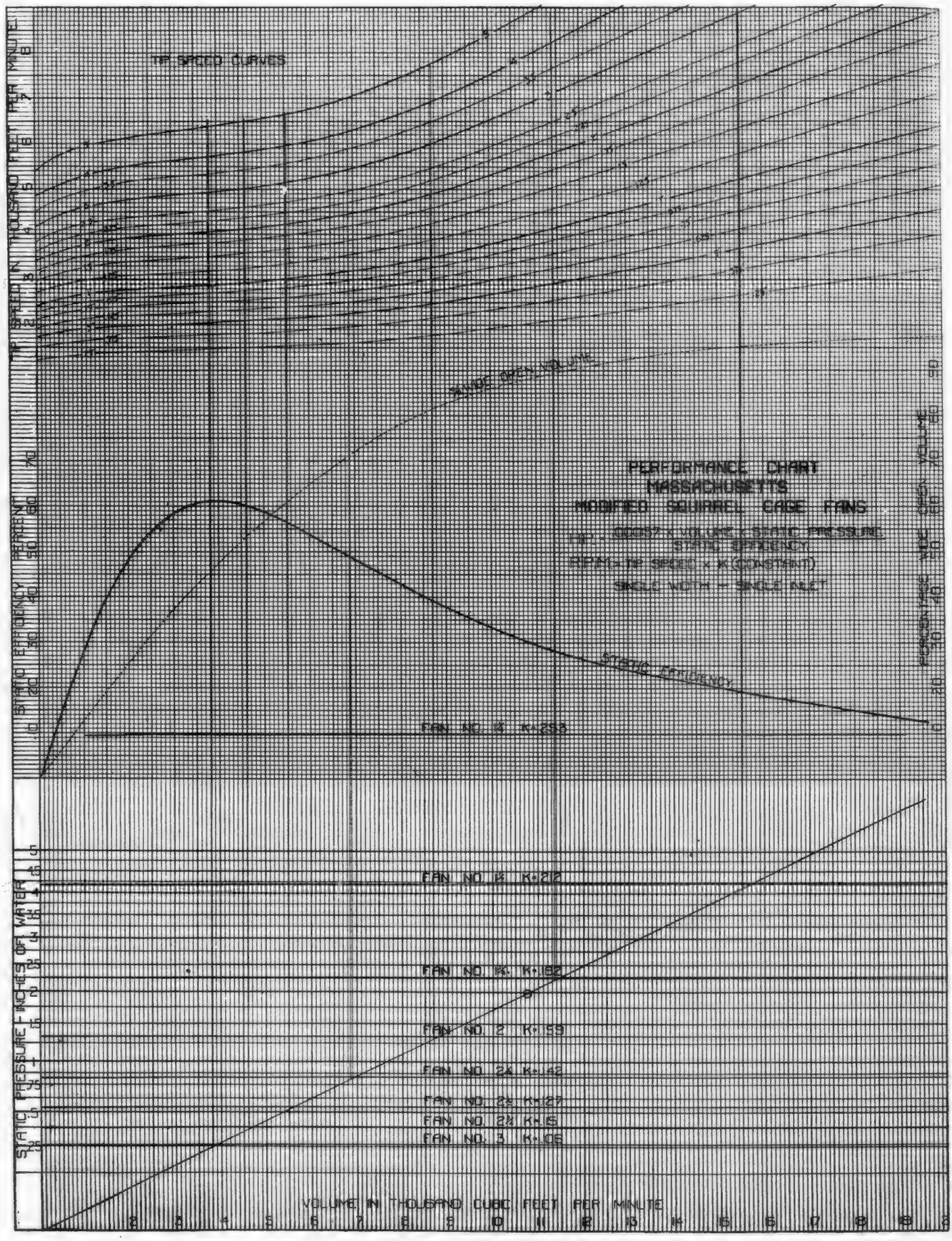
The boiler should be thoroughly washed out and entirely emptied of water, using a mop or sponge to remove any water which remains standing in the shell of the boiler, or elsewhere. Every accessible part should be thoroughly cleaned of soot and ash, both inside and outside, and any scale or sediment that may have collected in the boiler should be removed. After the boiler has been thoroughly washed out with a powerful stream of water from a hose it may be dried out by placing a small, lighted, single burner kerosene stove in the fire box, leaving it there until it burns out. The boiler should not be dried by building a fire upon the grate, even though very light materials are used, because there is danger of seriously damaging the boiler in this way.

A rag saturated with mineral oil should be forced through the fire tubes. Any rust or other deposit in the boiler should be carefully removed by scraping or with a scratch brush and after being thoroughly cleaned should receive a preservative coating of oil, especially if the boiler is installed in a damp basement. In such cases the outside surfaces should be covered with a coat of preservative paint or mineral oil.

Soot and ash should also be removed from the setting, the side walls cleaned down and the grates cleaned and brushed, paying particular attention to corners of firebox and space on outer edge of grate rests and end bars. The ash-pit and the breeching should be thoroughly cleaned out, sparing no work in any of these respects. When prepared as above, care should be taken to see that no water can flow through the feed valve into the boiler.

When starting up in the fall, fill the boiler with water, wash out, and refill to the normal height.

*The method followed in the case of a cast-iron boiler would be somewhat similar.


TIP SPEED CURVES
TIP SPEED IN THOUSAND FEET PER MINUTE
STATIC EFFICIENCY PERCENT
BRAKE HORSEPOWER
SHAFT SPEED - R.P.M.
PERFORMANCE CHART
MASSACHUSETTS
MODIFIED SQUIRREL CAGE FANS
TIP = SPEED x K (VOLUME + STATIC PRESSURE)
STATIC EFFICIENCY
R.P.M. = TIP SPEED x K (CONSTANT)
SINGLE WIDTH - SINGLE INLET
BRAKE SPEED - R.P.M.
STATIC EFFICIENCY
FAN NO. 4 K=.253
FAN NO. 3½ K=.212
FAN NO. 3 K=.182
FAN NO. 2½ K=.159
FAN NO. 2 K=.142
FAN NO. 1½ K=.127
FAN NO. 1 K=.113
FAN NO. ½ K=.106
STATIC PRESSURE INCHES OF WATER
VOLUME IN THOUSAND CUBIC FEET PER MINUTE

Typical Performance Chart of Massachusetts Modified Squirrel-Cage Fans, Published in Colors in Recent Catalog

An Exceptionally Fine Engineering Catalog

The new catalog featuring Massachusetts modified squirrel-cage fans, manufactured by the Massachusetts Blower Division of the Bishop & Babcock Sales Co., Cleveland, O., was mentioned under "New Trade Publications" in THE HEATING AND VENTILATING MAGAZINE for August, but the manner in which the performance charts of the fans are presented is so unusual and so beautifully done that a reproduction of a page is presented on opposite page.

The data presented in this form are readily used for graphically determining the best fan for any particular purpose. The chart is drawn on cross-section paper with green rulings, the curves are done in black and the diagonal lines and circles used in working the specific problems cited are in red.

To show the application of this chart, the following example is given:

"Wanted, a fan to deliver 10,800 CFM against 2-in. static pressure:

"The small circle on the lower portion of the chart is the point corresponding to the above volume and static pressure. Draw a line through this point and the zero point crossing the fan lines as shown. From the points where this diagonal line crosses each fan line, draw vertical lines extending to the top of the chart. The data as tabulated below are secured from the intersecting points of these lines and the curves:

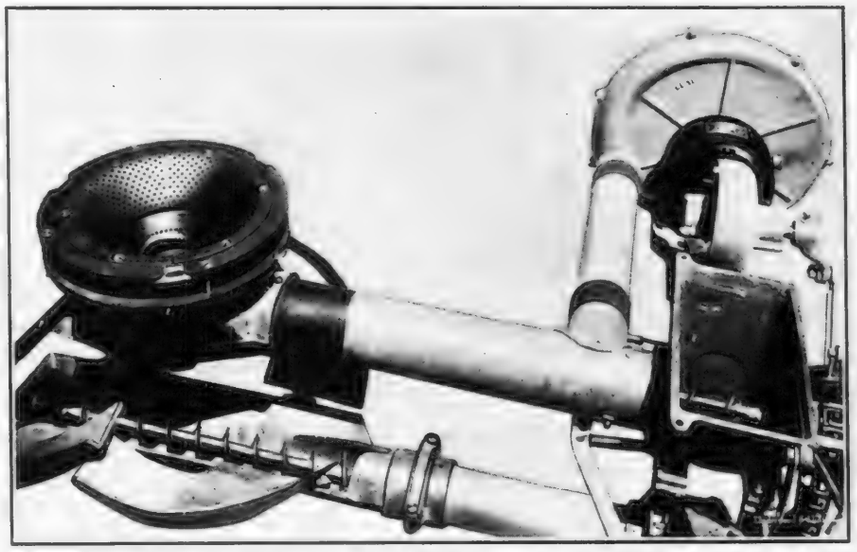
Fan Size No.	Vol. Cu. Ft. per Min.	Press. In.	Static Effi. Per cent.	Tip Speed Ft. per Min.
1½	10,800	2	18½	7,350
1¾	10,800	2	27½	5,800
2	10,800	2	38½	4,850
2¼	10,800	2	48	4,400
2½	10,800	2	56	4,200
2¾	10,800	2	59½	4,100
3	10,800	2	61	4,000

"Fans No. 1½, 1¾ and 2 are discarded as the tip speed is too high for normal service and the efficiency too low. No. 2¼ would also be discarded unless some unusual condition of speed or limited space exists. This leaves Nos. 2½, 2¾ and 3. Any of these three fans will meet the requirements, the selection depending upon the engineer's preference and the purpose for which the fan is intended. The cost of the fan and horsepower requirements also should be considered.

"Having selected the fan best suited to the requirements, we proceed by arithmetical calculation to obtain the horsepower required by the formula:

$$\text{H.P.} = \frac{0.000157 \times \text{Vol.} \times \text{Static Pres.}}{\text{Static Efficiency}}$$

and the speed of the fan in revolutions per minute by the formula R.P.M. = Tip Speed × K; K being a constant, as shown on the charts for each size of fan."

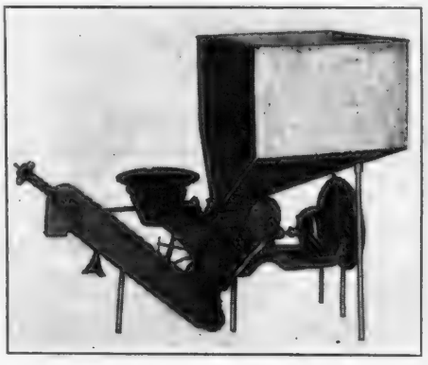


Grate and Operating Mechanism of "Electric Furnace Man"

Economy of Buckwheat Coal in Domestic Heating

FOR some time, combustion engineers have been devoting their attention to the possibilities in the use of the small size of anthracite coal for domestic heating. The difficulties in burning these small sizes by the hand-fired method are well-known and have concentrated attention on the development of automatic firing methods which could use such sizes as rice and buckwheat. In most localities, these sizes can be purchased for about one-half the price of the larger sizes of furnace coal.

One of the means which has been adopted with success has been to provide a coal supply hopper equipped with a mechanical conveyor by which coal may be fed to a specially-designed burner. In one apparatus of this type, known as the "Electric Furnace Man," which attracted so much attention at this year's National Heating and Ventilating Show, such an attachment is provided,



"Electric Furnace Man" Ready for Installation

which not only feeds the coal to the burner, but also removes the ash refuse direct to a waiting can outside the heater.

In this particular burner, the coal is fed at the rate of from 2 to 22 lbs. per hour as desired. Air for combustion is supplied by a blower.

In the accompanying table are given data, prepared by C. H. Hall, chief engineer of The Domestic Stoker Company, New York, to show the relative economy of burning No. 1 buckwheat coal in a furnace of this type as compared with burning anthracite soft coal, hand-fired. The duration of the test was 48 hours.

From the data contained in the table the total loss of heat with the stoker-fired unit is 33.96%, giving the unit a burning efficiency of 66.04%. With the hand-fired unit the burning efficiency came to 55.14%.

If furnace coal costs $15 per gross ton and has a heat value of 12,500 B.T.U.

Typical Installation in New York Telephone Branch Central Building, 208 East 79th St., New York

		Stove Coal Natural Draft	No. 1 Buckwheat Coal
1.	Heat value, B.T.U. per lb. (dry basis)	12,741	12,624
2.	Manufacturer's boiler rating (steam) sq. ft. cast-iron house-heating type	775	775
3.	Water heating surface in boiler	37.4	37.4
4.	Area of grate (circular)	2.64	1.31
5.	Draft equipment	Natural	Forced
6.	Coal fired per hr. per sq. ft. of grate, lb.	5.13	6.28
7.	Total coal fired during 48-hr. test, lb.	650	795
8.	Total refuse from coal fired, lb.	123	120
9.	Percent of refuse of coal fired, %	18.92	15.1
10.	Percent of combustible in refuse, %	34.32	18.59
11.	Heat absorbed by boiler, %	55.56 (without baffling)	50.67
12.	Heat lost in combustible in refuse, %	7.60	4.58
13.	Heat lost in escaping gases, %	16.14 (without baffling)	22.88
14.	Heat lost in unburned CO in escaping gases, %	14.62	.21

EVAPORATION DATA AND ECONOMIC PERFORMANCE

		Stove Coal Natural Draft	No. 1 Buckwheat Coal
15.	Total water evaporated during test, lb.	3,796	4,504
16.	Equivalent of water evaporated from and at 212° F., lb.	4,742.8*	5,120.5
17.	Equivalent water evaporated from and at 212° F. per hour, lb.	98.8*	106.7
18.	Equivalent water evaporated from and at 212° F. per hr. per sq. ft. of heating surface, lb.	2.64*	2.85
19.	Equivalent water evaporated from and at 212° F. per hr. per sq. ft. of grate surface, lb.	37.4*	40.4
20.	Water evaporated from and at 212° F. per lb. of coal fired, lb.	7.30*	6.45

TEST DATA ON BURNING STOVE COAL (HAND-FIRED) AND BUCKWHEAT COAL (STOKER-FIRED) IN A DOMESTIC HEATER

		Stove Coal Natural Draft	No. 1 Buckwheat Coal
21.	Sq. ft. of radiation which boiler would have supplied on basis of 250 B.T.U. per sq. ft. on radiation, sq. ft.	384*	414
22.	Average energy input to draft equipment, watts		93.9
23.	Kw. hours consumed per gross ton of coal fired, kw. hr.		12.7
24.	**Net operating economy effected by use of No. 1 buckwheat at $7.50 per gross ton vs. stove coal at $15.50 per gross ton, (electric energy for fan figured at 7c per kw. hr.), %		37.3*

GAS ANALYSIS

		Stove Coal Natural Draft	No. 1 Buckwheat Coal
25.	Average percent CO_2	8.20	13.6
26.	Average percent O_2	8.73	5.6
27.	Average percent CO	2.84	0.05
28.	Average percent N_2	80.23	80.55
		100.00	100.00

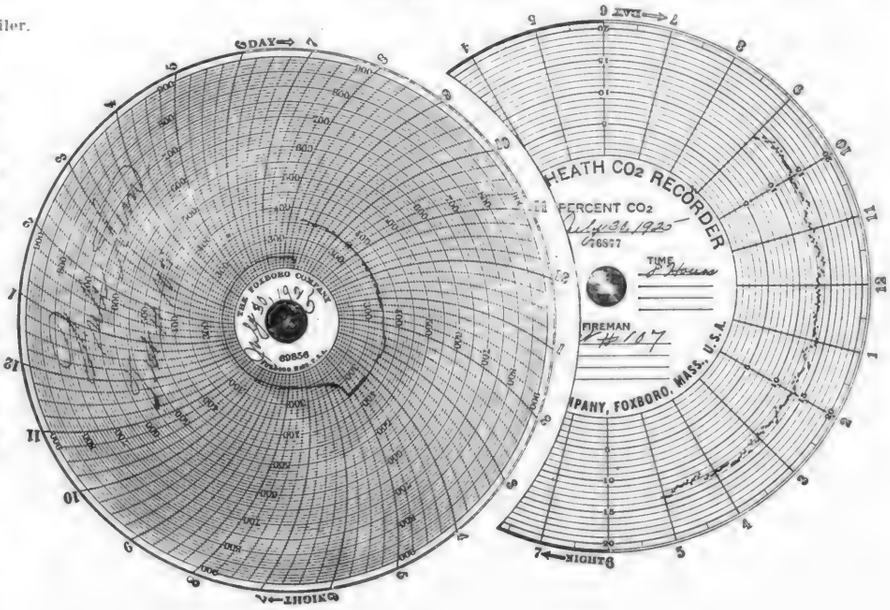
*Corrected for radiation loss from uncovered boiler.
**Fixed charges on investment not included.

per pound and is fired by hand at an efficiency of 45%, and No. 1 buckwheat coal at $7.50 per gross ton, having 12,500 B.T.U. per pound and used in a stoker at 68% efficiency, the approximate cost of making 1,000 lbs. of steam would be:

With furnace coal, hand-fired.....$1.25
With buckwheat coal, stoker-fired .45

Difference in cost per 1000 lbs. steam ..... .80

This would effect a net operating economy of 36%.



Flue Gas Temperature and CO_2 Charts from Test of "Electric Furnace Man"

To Make Surveys of the Heating and Plumbing Industries

According to action taken at a meeting of the board of directors of the National Trade Extension Bureau, held in Evansville, Ind., June 25, a campaign will be instituted immediately to stimulate greater interest on the part of heating and plumbing contractors in making a survey of their local territories to determine what buildings, stores and offices need heating and plumbing equipment. The possibilities in this direction are well known, in fact, the lack of salesmanship on the part of heating and plumbing contractors has been mentioned more than once as a reason why the oil-burner manufacturers so often look askance on selecting heating and plumbing contractors as their dealers. The outcome of the campaign may thus have a far more important effect than only extending the heating and plumbing contractors' present activities.

Insulation for Warm Air Furnaces

A form of insulation especially adaptable for use with warm-air furnaces and composed of mineral or rock wool, made into the form of a felt, known as Minwool, is manufactured by the Minwool Insulating Company, Toledo, O. This material has been found sufficiently flexible to take care of the extremes of expansion and contraction to which warm air furnaces are liable.

Minwool is composed of millions of tiny tubular air cells. One of its interesting characteristics is that it acts as a muffler and helps materially to silence both operating and combustion noises. At the same time it increases the rigidity of the furnace housing, tending to stop any vibration of the sheet metal.

Minwool has been rated by the Government Bureau of Standards as showing one-sixth the heat loss of asbestos, cement and approximately one-half the heat loss of 85% magnesia.

Present Practice in Vapor Heating

Previous articles in this series are:

1. *Webster Type R Modulation System, August*, 1925.
2. *Dunham Home Heating System, August*, 1925.

The Illinois System

In the revision here presented of the data on the Illinois System as published in THE HEATING AND VENTILATING MAGAZINE'S standard data sheets, Nos. 132KK and 132LL, it should be noted that there have been no changes in the system itself since the last data sheets were issued. The view of a typical installation shows two tiers of radiators instead of three, which serves to make the design a little clearer.

The Illinois vapor system enjoys the distinction of being the first system to use a return trap or alternating receiver in connection with a vent seal valve. The principle involved in this method has become general practice. The company has manufactured this system for about 17 years. The last improvement was the use of the Browne heat retainor, in place of a diaphragm-type air check valve. This device was adopted as a regular part of the system about four years ago.

Fig. 2. Illinois Modulating Valve

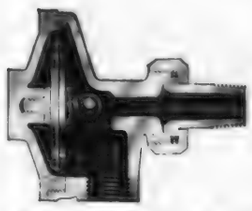


Fig. 3. Illinois Thermo Radiator Trap

SIZES, CAPACITIES OF ILLINOIS MODULATING VALVES

Size In. Dia.	Capacity Sq. Ft. Direct Radiation	C Inlet to Face In.	C Tail-piece to Face In.	Weight, Lbs.
¾	100	2⅝	1⅜	2
1	200	3⅛	1 9/16	2¾
1¼	275	3½	1¾	4½
1½	400	4	2	4¾

SIZES, CAPACITIES, DIMENSIONS OF ILLINOIS TRAP

Size In. Diam.	Capacity Sq. Ft. Direct Radiation	Pipe Connections In. Diam.	Weight, lbs.	Center Outlet to end of Spud, In.	Center Spud to Face of Outlet In.
½ (Junior)	75	½	2½	2½	1¾
¾	500	¾	4	2¾	2 7/16
1	1500	1	17	1¾	3¼
½ (Standard)	200	½	3	2½	1¾

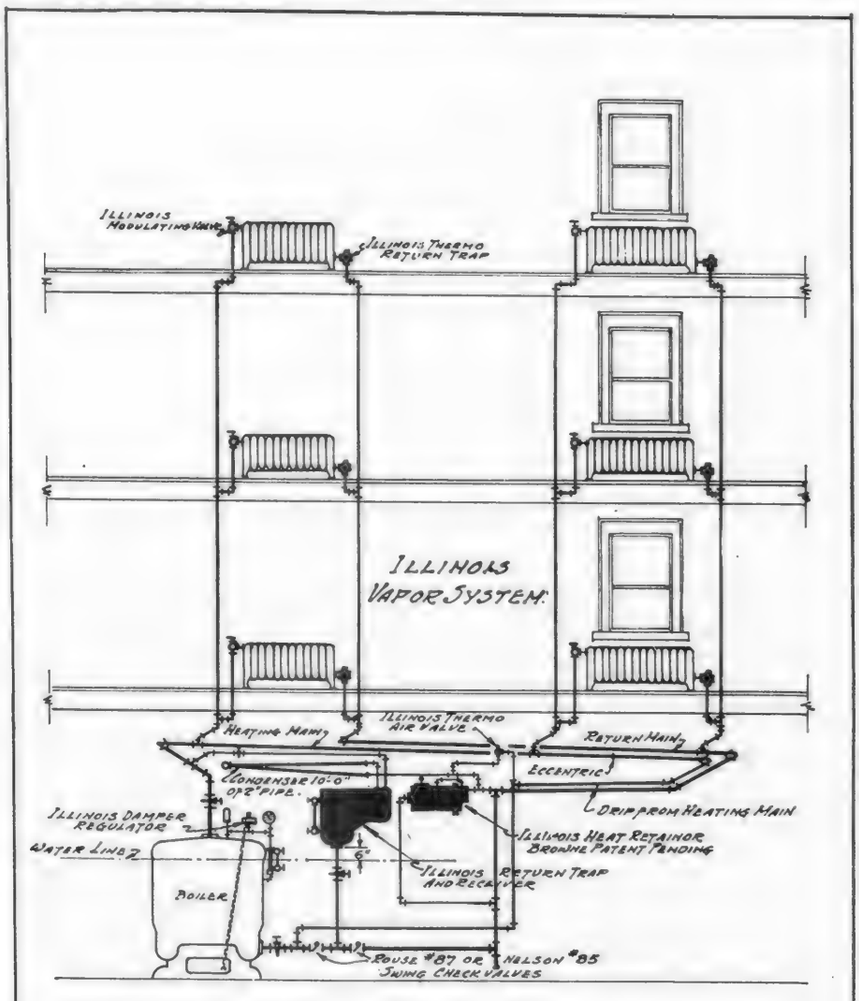


Fig. 1. Typical Installation of Illinois System

THE Illinois vapor system has been developed by the Illinois Engineering Co., Chicago, Ill., one of the pioneers in this field. It can be or is operated below atmospheric pressure for hours at a time, but it is also to be classed as a modulating system, the radiators being equipped with quick-opening supply valves (Fig. 2) which give a range from full steam to no steam on a half turn of the handle.

The Illinois System includes specialties or appliances which are designed to take care of any conditions of pressure or vacuum which are possible in a low-pressure heating system. These include a return trap (Fig. 5) which operates automatically to put the water of condensation back into the boiler, regardless of the boiler pressure, up to a limit of 10 lbs. pressure, and a heat retainor (Fig. 4) which allows the air from the system to vent, but prevents its drawing back into the heating system, thus making it possible to operate as a true vapor system.

All of the radiators are equipped with the Illinois thermo traps (Fig. 3) which discharge the air and condensation into the return mains which run to the return trap. Quick heating up of the system is made possible by the thermo trap which provides a 5/16-in. air outlet on each radiator.

The air vent from the return trap and the vents from the return mains terminate at the heat retainor which acts as an air-liberating and seal device for

PIPE SIZES—RADIATOR TAPPINGS FOR USE WITH ILLINOIS SYSTEM

Mains			Risers			Horizontal Supply Branches Mains to Risers		Horizontal Return Branches Mains to Risers	
Supply, In. Diam.	Radiation, Sq. Ft.	Return, In. Diam.	Supply, In. Diam.	Radiation, Sq. Ft.	Return, In. Diam.	Supply, In. Diam.	Radiation, Sq. Ft.	Return, In. Diam.	Radiation, Sq. Ft.
2	400	1¼	¾	40	¾	¾	20	¾	60
2½	700	1½	1	80	¾	1	60	1	350
3	1,250	1½	1¼	150	1	1¼	110	1¼	1,700
3½	2,000	1½	1½	220	1	1½	160		
4	3,000	2	2	500	1	2	400		
4½	4,300	2½	2½	900	1¼	2½	700	Tappings for Radiators	
5	5,600	2½	3	1,500	1¼	3	1,100	¾"x½" up to 100 sq. ft.	
6	9,000	3	3½	2,100	1¼	3½	1,800	1"x½" up to 150 sq. ft.	
7	14,000	3½						1¼"x¾" over 200 sq. ft.	
8	19,000	4							

Fig. 4. Illinois Heat Retainor (Browne patent).

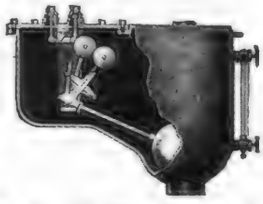


Fig. 5. Illinois Return Trap

CAPACITIES OF ILLINOIS HEAT RETAINOR

No.	Capacity Sq. Ft. of Radiation	Length, Inches	Width, Inches	Height, Inches	Weight, Lbs.
00	1500	14½	5⅞	13½	95
0	2500	20	7¾	15¼	140
1	5000	27	9½	23	305
2	8000	29	12¾	23	330

the entire piping system. This permits the air to be vented from the system at about 1/3-oz. pressure, but prevents the return of air into the system when the pressure in the system falls below atmospheric pressure—that is, when the system is operated as a vapor system.

The ends of the steam mains are dripped into a separate return which is carried back to the boiler without passing through the return trap.

tors, and bottom tapping of steam-type radiators. Its chief feature is the method of visibly adjusting its valve port for various-sized radiators with ease and accuracy after installation, even when the system is in operation.

The valve bonnet is marked with twenty graduations, each of which represents a port area equivalent to 10 sq. ft. of radiation. Above the bonnet there is a movable dial plate, held in place by a lock nut.

To adjust the valve for the radiator requirements the lock nut is loosened and the valve handle turned, which likewise turns the dial plate and rotary sleeve. This varies the port area in accordance with dial graduations. Thus, with twenty graduations visible, the port area is sufficient for a 200-sq. ft. radiator; with fifteen graduations, for 150-sq. ft., etc.

The No. 8 Hoffman return-line valve, (Fig. 3) is used at the return end of each radiator to permit the air and water of condensation to pass into the

Hoffman Controlled Heat

HOFFMAN Controlled Heat is designed to circulate steam at any pressure above atmospheric, to return the water of condensation to the boiler by gravity, and to give positive steam control to each radiator. Fig. 1 shows a typical piping arrangement and the application of Hoffman equipment.

The steam and dry-return mains start high at the boiler and grade down, in direction of arrows, to a point where they are dripped into a wet return, which carries the water of condensation back to the boiler so as to keep all mains full of steam, even though radiators are turned off.

FEATURES OF MODULATING VALVE

The No. 7 Hoffman adjustable modulating valve, shown in Fig. 2, is made in ¾-in. size only and is designed for direct cast-iron radiators up to 200 sq. ft. It is used with either steam or water-type radiators, and is usually connected at the top tapping of water-type radia-

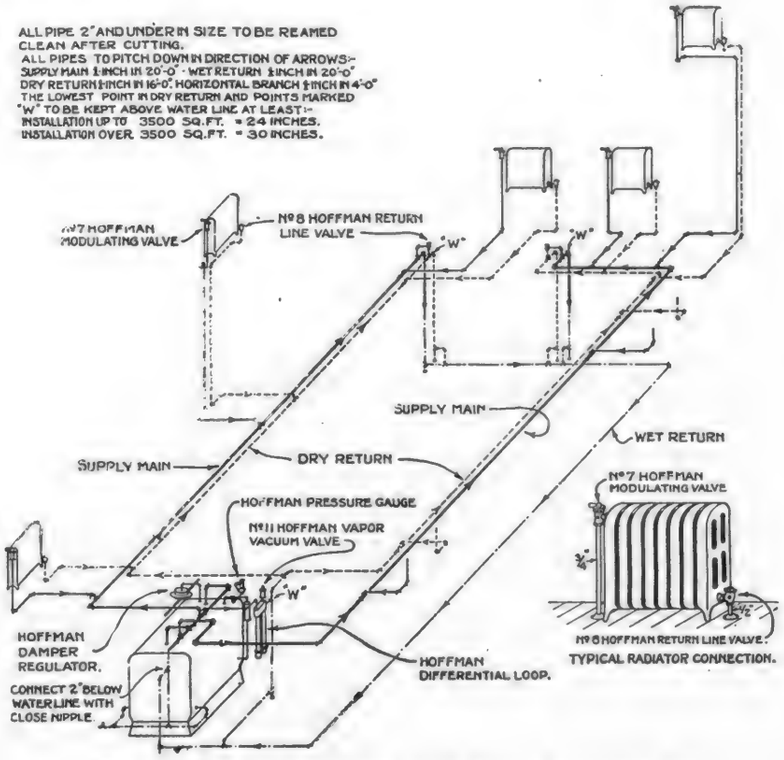

ALL PIPE 2" AND UNDER IN SIZE TO BE REAMED CLEAN AFTER CUTTING.
ALL PIPES TO PITCH DOWN IN DIRECTION OF ARROWS:- SUPPLY MAIN 1 INCH IN 20'-0" - WET RETURN 1 INCH IN 20'-0" DRY RETURN 1 INCH IN 16'-0". HORIZONTAL BRANCH 1 INCH IN 4'-0"
THE LOWEST POINT IN DRY RETURN AND POINTS MARKED "W" TO BE KEPT ABOVE WATER LINE AT LEAST:- INSTALLATION UP TO 3500 SQ.FT. = 24 INCHES. INSTALLATION OVER 3500 SQ.FT. = 30 INCHES.
Nº7 HOFFMAN MODULATING VALVE
Nº8 HOFFMAN RETURN LINE VALVE
"W"
SUPPLY MAIN
WET RETURN
SUPPLY MAIN
DRY RETURN
HOFFMAN PRESSURE GAUGE
Nº11 HOFFMAN VACUUM VALVE
HOFFMAN DAMPER REGULATOR.
CONNECT 2" BELOW WATER LINE WITH CLOSE NIPPLE
HOFFMAN DIFFERENTIAL LOOP.
Nº7 HOFFMAN MODULATING VALVE
Nº8 HOFFMAN RETURN LINE VALVE.
TYPICAL RADIATOR CONNECTION.

Fig. 1. Typical Installation of Hoffman Controlled Heat

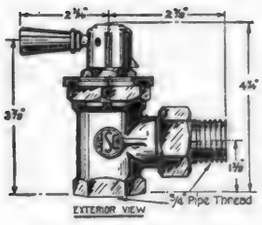


Fig. 2. No. 7 Hoffman Adjustable Modulating Valve

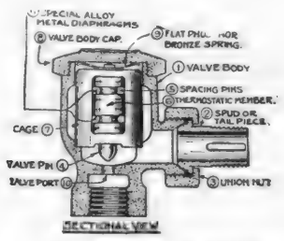


Fig. 3. No. 8 Hoffman Return-Line Valve

return piping and to stop steam leaving the radiator. It is also used at the end of steam mains to vent air into the dry return. It is designed to operate consistently under a pressure range from 13 in. of vacuum to 50 lbs. steam pressure without adjustment. Water at a temperature of approximately 12° less than the temperature corresponding to the steam pressure, it is stated, causes full valve opening and free discharge of condensation.

The thermostatic member may be removed and changed from one valve to another of the same size without adjustment.

The No. 8 valve has ½-in. pipe connection, ¼-in. port, and is furnished in angle, straightway, right and left-hand offset patterns. The normal capacity is 200 sq. ft. of direct cast-iron radiation.

The No. 9 Hoffman return-line valve is constructed and operates the same as the No. 8 valve, but is ¾-in. in size, and has a rated capacity of 600 sq. ft. It is made in angle and straightway patterns only and has a ⅜-in. port, for pressures up to 15 lbs., and 3/16-in. port for higher pressures.

The Hoffman differential loop is a non-mechanical device, designed to maintain a constant pressure differential between the supply and return pipes when the boiler pressure exceeds a predetermined amount. It is usually installed near the boiler. Fig. 4 shows points of connection as follows:

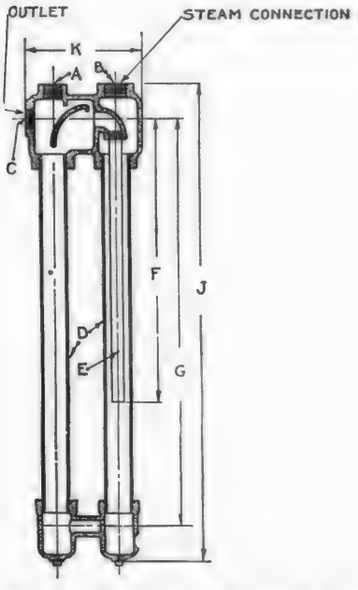


Fig. 4. Hoffman Differential Loop

A—To No. 11 Hoffman vapor-vacuum valve.

B—To steam space of boiler.

*C—To high end of dry-return main.

*Important: At least 24 in. above water-line of boiler.

This closes the venting port of the Hoffman valve installed on the loop for venting the system. The air in the return main is then compressed, building up a pressure and preventing further rise of water in the vertical part of the return above the predetermined height.

As soon as this is accomplished, and the action is instantaneous, the loop reseals, and no more steam is blown over until the differential pressure is no longer maintained. By the alternate blowing over and resealing of the loop, a constant differential pressure is maintained between the steam and return mains.

Through the maintenance of this differential, regardless of how high the boiler pressure goes, circulation will

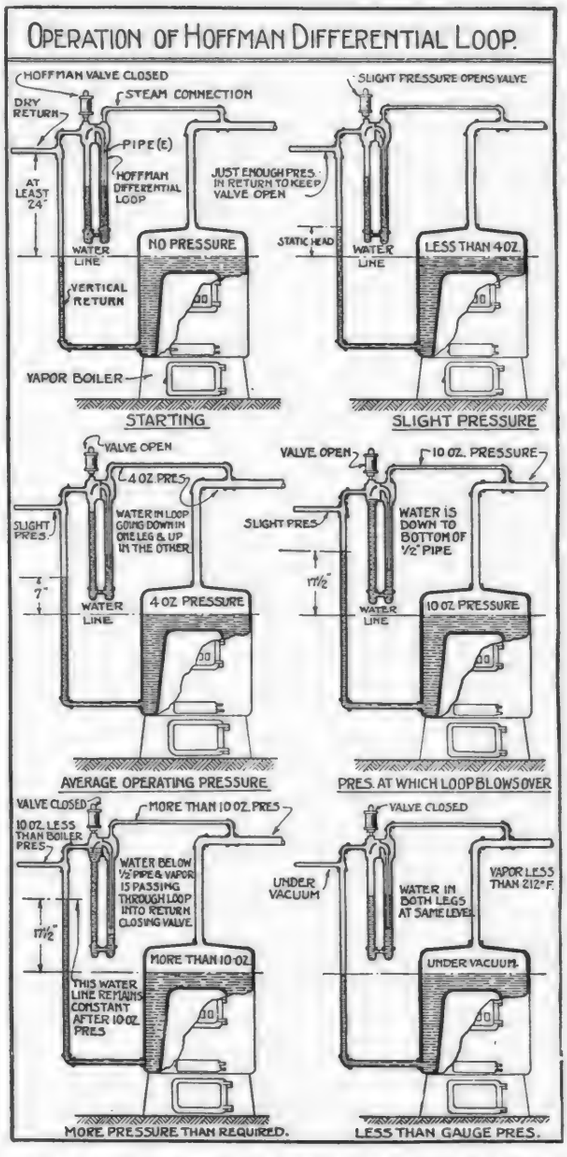


Fig. 5. Operation of Hoffman Differential Loop

The operation of the Hoffman differential loop is illustrated in Fig. 5.

By its operation, water is permitted to rise in the vertical return mains to a predetermined height, when the loop functions, flowing over a small quantity of steam through internal tube "E". take place in a radiator when turned on, with the return-main vent closed by loop action.

The No. 11 Hoffman vapor-vacuum valve, shown in Fig. 6, is connected to the top of the differential loop to permit the removal of air from and to prevent

the return of air to the system. Its vent port is normally closed, but as soon as a slight pressure is exerted the vacuum check is lifted from its seat and the air allowed to vent from the system. When the pressure drops, the vacuum check closes the vent port, preventing the intake of air.

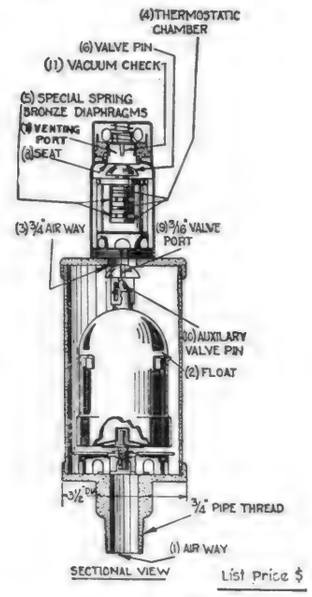


Fig. 6. No. 11 Hoffman Vapor-Vacuum Valve

GENERAL NOTES

The lowest point in the dry return and the points marked "W" must be at least 24 in. above water-line of the boiler for jobs having up to 3500 sq. ft. of radiation and 30 in. for jobs having more than 3500 sq. ft. of radiation.

All steam-supply tappings from boiler must be used full size and in accordance with the requirements of the boiler manufacturer. The boiler must be cleaned (probably several times) until it holds a steady water line.

Do not order radiation until heights under windows have been checked at building.

Radiators having up to 12 sections can be connected top and bottom; same end, when building conditions make it necessary.

All pipes to pitch down in direction of arrows as follows:

Supply main.....1 in. in 20 ft.
Wet return main.....1 in. in 20 ft.
Dry return main.....1 in. in 16 ft.
Horizontal branches.....1 in. in 4 ft.

SUPPLY MAINS

Table No. 1 is computed for pressure loss of 2 oz. at the farthest radiator for length of main, allowing for average number of elbows, tees, etc., and for condensation in covered piping, steam and condensation flowing in same direction.

To size a main, measure length of piping from boiler to farthest radiator and use column for this length for sizing entire length. Example: Measured length from boiler to farthest radiator = 295 ft. Then use Col. F.

At end of main = 280 sq. ft. = 2½-in. main.
50 ft. from end of main = 450 sq. ft.
Total load to this point = 730 sq. ft. = 3½-in. main.
Near boiler = 400 sq. ft.
Total load to boiler = 1130 sq. ft. = 4-in. main.

TABLE 1

CAPACITY OF SUPPLY MAINS IN SQ. FT.

COL. A	MEASURED LENGTH OF PIPE IN FT FROM BOILER TO FARTHEST RADIATION.					
SIZE OF PIPE	COL. B	COL. C	COL. D	COL. E	COL. F	COL. G
	100'	150'	200'	250'	300'	400'
2	325	280				
2½	550	450	380	347	310	275
3	1000	810	710	632	578	500
3½	1500	1215	1068	948	860	750
4	2100	1700	1500	1325	1200	1050
4½	2900	2350	2060	1830	1670	1450
5	3700	3000	2600	2340	2140	1850
6	5700	4600	4047	3600	3300	2850
7	8000	6480	5680	5050	4600	4000
8	11000	8900	7810	6950	6350	5500
10	20000	16200	14200	12600	11500	10000
12	30000	24300	21300	18960	17300	15000

For steam and condensation flowing in opposite directions use pipe one size larger than given in table.

TABLE 2

CAPACITY OF WET RETURN MAINS IN SQ. FT.

SIZE OF PIPE	1¼"	1½"	2"	2½"	3"	3½"
LENGTH 100	1500	3000	6000	10000	18000	26000
LENGTH 200	1200	2500	5000	8000	14000	20000
LENGTH 300	1000	2000	4000	6000	11000	16000

TABLE 3

CAPACITIES OF SUPPLY RISERS IN SQ FT

COL A	LENGTH IN FT. FROM BOILER TO END OF RISER					
SIZE OF PIPE	COL. B	COL. C	COL. D	COL. E	COL. F	COL. G
	100'	150'	200'	250'	300	400'
1"	40	32	28	25	23	20
1¼	75	60	53	47	43	37
1½	150	120	105	95	86	75
2	300	240	210	190	173	150
2½	500	400	355	315	285	250
3	900	730	630	565	520	450

HORIZONTAL BRANCHES TO RISERS TO BE ONE SIZE LARGER THAN RISER

Horizontal branches to risers to be one size larger than riser.

Where possible, dry return mains are to start high at differential loop and grade down to low point and drip into wet-return main.

Starting at the loop, pipe sizes should be as follows:

Jobs up to 1000 sq. ft. = 1 in.
From 1001 to 3500 sq. ft. = 1¼ in.
From 3501 to 7500 sq. ft. = 1½ in.
From 7501 to 15,000 sq. ft. = 2 in.

Example: Length of main, 190 ft. Total radiation, 2050 sq. ft. Then use Col. D for sizing.
Start at loop with 1¼ in.
Up to 90 ft. from loop, 560 sq. ft. = 1¼ in.
From 90 ft. to 140 ft. from loop, 560 sq. ft.
Total load to this point, 1120 sq. ft. = 1½ in.
From 140 ft. from loop to end, 1000 sq. ft.
Total load on main, 2120 sq. ft. = 2 in.

TABLE 4

CAPACITY OF DRY RETURN MAINS IN SQ FT.

COL. A	LENGTH IN FEET FROM BOTTOM OF RISER TO HOFFMAN DIFFERENTIAL LOOP.					
SIZE OF PIPE	COL. B	COL. C	COL. D	COL. E	COL. F	COL. G
	100'	150'	200'	250'	300'	400'
1	320	300	288	272	245	210
1¼	670	630	600	570	535	470
1½	1300	1215	1170	1100	1045	910
2	2300	2185	2070	1955	1840	1610
2½	3800	3610	3420	3200	3040	2660
3	7000	6650	6300	5950	5600	4990
3½	10000	9500	9000	8500	8000	7000
4	15000	14250	13500	12750	12000	10500

TABLE 5

RETURN RISERS				
SIZE OF PIPE	¾"	1"	1¼"	1½"
CAPACITY IN SQ FT.	300	630	1300	2200

TABLE 6

RADIATOR CONNECTIONS

SUPPLY				RETURN		
VALVE NO.	VERTICAL INLET PIPE TO VALVE	HORIZONTAL RUNOUT FROM VERTICAL INLET PIPE TO RISER OR MAIN.		VALVE NO.	STUB TO VALVE	HORIZONTAL RUNOUT TO RISER OR MAIN
		UP TO 5' LONG	OVER 5' LONG			
7	4½"	24 ♦ = 1" 70 ♦ = 1¼ 150 ♦ = 1½ 200 ♦ = 2	16 ♦ = 1" 60 ♦ = 1¼ 130 ♦ = 1½ 175 ♦ = 2	8	1" 2	3/4" 4

Radiators to be water-type of not over 200 sq. ft. capacity, tapped or bushed at the top for No. 7 Hoffman adjustable modulating valve and at the bottom ½ in. eccentric, turned down for No. 5 Hoffman return valve.

Supply and return connections can be made at same or opposite ends as desired.

ACTION OF HOFFMAN DAMPER REGULATOR

The Hoffman damper regulator, because of the compensating or balancing plate, may be likened to a pair of scales. It is designed to control the dampers so effectively that when inlet valves are turned on or off the fire will be accelerated or retarded to meet the change in the demand for vapor. A low constant pressure may be maintained so that vapor will enter the radiator as soon as the valve is turned on. This regulator has an additional feature in that the fulcrum on which the lever is suspended may be turned at different angles, permitting a straight chain connection with the dampers, instead of at an angle, which is so frequently the cause of the damper's binding.

A GAUGE WHICH MEASURES TEMPERATURE OF VAPOR IN BOILER

The Hoffman Ther-Kompo gage is used to indicate the temperature of the vapor being generated in the boiler, whether the plant is operating under pressure or vacuum conditions. It measures pressures up to 30 lbs., the first 5 lbs. being shown in ounce graduation. Vacuum is shown up to 30 in., the first 10 in. being indicated in ½-in. graduations, while the temperature range is 150-225° F.

Certified Heating in Kansas City

IN connection with the establishment in Kansas City of a bureau to carry out the certified heating plans of the Heating and Piping Contractors Kansas City Association, J. C. Heslip, the engineer in charge, gives some interesting side lights on the operation of the plan.

"The other day" he states, "I was checking over plans of a proposed new home. It was a beautiful design of an English type, arranged, it seemed, to nestle low on a southern slope amid carefully planned landscaping.

"Checking our plans of a proposed new home. The exterior of the house was an earnest expression of an artistic mind. The grace of its roof lines was inspiring. The apparent casual use of brick and stone and half-timber in its picturesque assemblage gave it also the desirable air of informality. How easy it would be to submit to such inviting comfort.

"The interior was well designed. The rooms were large and suggested convenience and comfort. The spacious hall with stairway was nicely arranged and showed great possibilities in refinement. The dining room, with its paneled walls and beamed ceiling, guarded on one side by the sunroom and its many windows, and on the other side by the breakfast room and its coziness, formed another home unit of comfort. The kitchen, with its provision for many labor-saving devices, and even the pantry and its place-for-everything importance held promise of happiness and contentment for the family that hardly could wait to enjoy its comforts.

"The designers probably believed they had completed a masterpiece. From an architectural standpoint it easily could have been so except for the one important feature: the heating plant was of faulty design.

"A careful check of the heating design showed the entire plant to be much smaller than would be required to make the home comfortable in the coldest winter months. The radiators in most of the rooms were entirely too small. In one or two they were too large. The improper sizes of the heating mains in the basement would not permit of uniform heating even though the radiation would have been computed properly. The heating boiler was two sizes too small.

"Now, how can such a misfit be guarded against?

"An engineering department will be maintained by the Heating and Piping Contractors' Association of Kansas City for the purpose of checking every heating design installed by any member of the association. If a design made by an architect, engineer or anyone else meets the standards of the national association, a seal of certification is applied to the job which guarantees the system to heat properly under severe winter conditions. This is not only a guarantee by the heating contractor but the certification binds the association as a party to this responsibility. This service is free to the builder who proposes to install a hot water or steam heating plant, whether it be in the more modest little homes or the largest of commercial buildings.

"The electrical installation and the plumbing are inspected by the city and are subject to its approval. In this way the owner reasonably is assured of workable results from these installations. This, however, is not true in the case of heating. Too many men posing as heating engineers have been permitted to make inaccurate designs with the sole object of furnishing certain makes of equipment in which they might be interested. Such designs, if not officially checked by a competent heating engineer, usually are allowed to go on without discovery until the plant is given a practical test the following winter. The place and time to inspect first is in the building plans before the construction is started and then another inspection at the completion of the job will insure the owner that the installation is made in accordance with the plans and specifications."

Buffalo Adopts Certified Heating

As a step in the inauguration of certified heating in Buffalo, the Heating and Piping Contractors Buffalo Association has been incorporated as a membership organization to develop the industry, to strive for higher standards, to combat unfair practices and to improve the character of work performed. The association is incorporated as a non-profit corporation, with the following officers:

President, Roger J. Moran; vice-president, George W. Frank; secretary, Roy P. Wilson; treasurer, John D. Ruckel.

Directors: Messrs. Moran, Frank, Wilson and William G. Fraser and Lawrence M. Castin. The headquarters of the association are at 406 Jackson Building, Buffalo.

Warm Air Heating Will be Featured at Fairs

The National Warm Air Heating and Ventilation Association has hit upon a clever scheme to present the merits of warm air heating. There has been built in the woodworking shop of the University of Illinois, under the direction of Professor V. S. Day, an exact miniature of the warm-air research residence located in Urbana, Ill., in which so many classic experiments have been conducted.

The house is built on a one-eighth scale and is approximately 6 ft. square. One corner of the house is so cut away that it is possible to view every room and the basement with its tiny warm air plant. The warm air system is provided with glass leaders, miniature stacks, regulators and cold air returns, through which air will be circulated by a fan at an exaggerated velocity. The motion of the air current will be shown by red and blue floss, fastened in the glass leaders. Streamers at the registers will show the warm air coming out.

The house is built as nearly as possible exactly like the research residence, even to imitation hardwood floors and electric lights. This little demonstration house undoubtedly will attract considerable attention to warm-air heating.

Demonstration Model of Warm-Air Research Residence

Saving Waste Heat

THE trite and paradoxical caption to this item is used solely because it entirely tells the story of a development that is rapidly becoming widespread in connection with oil-burner installations.

As is well known, the design of coal fired boilers is not ideal for oil or gas firing, largely due to the fact that the combustion rate of burners operating intermittently is so high that the heat-absorbing surfaces of the boiler are simply inadequate properly to handle the products of combustion. As a result the flue temperatures in such installations are much higher than they should be.

It is true that some of the heat leaving the boiler breeching is not lost to the building inasmuch as absorption from the chimney frequently results in a material difference in temperature of the gases at the base of the stack and at the roof line.

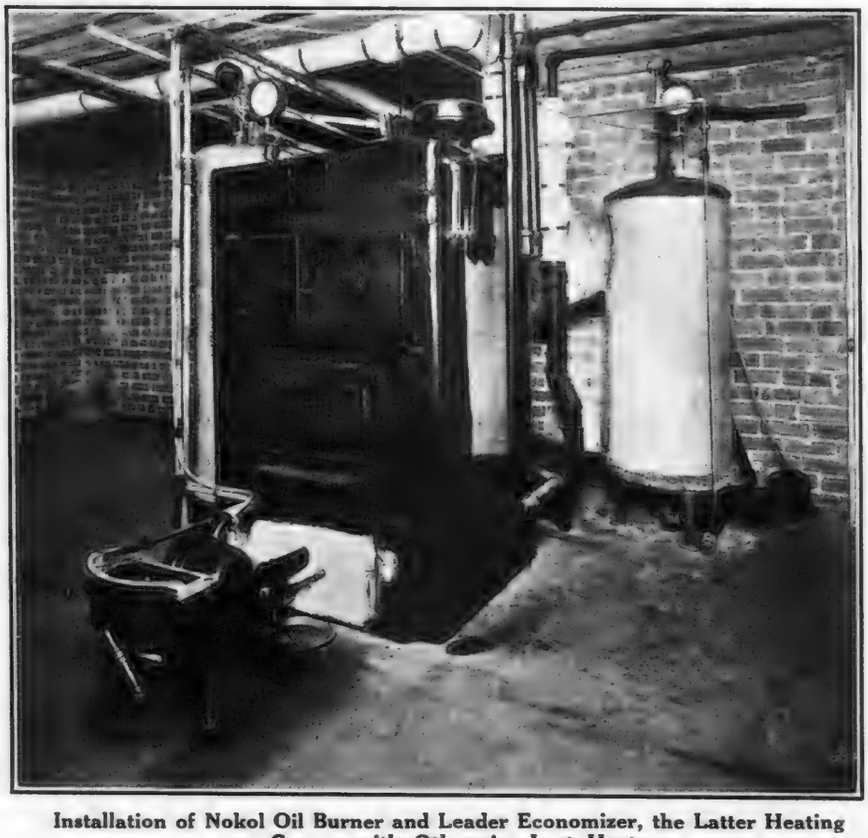
Following this line of thought there has been placed on the market several forms of what might be termed economizers whose function is to rob the stack gases of some of their excessive heat contents. In effect these are, of course, but supplementary indirect heating surfaces, outside of the boiler rather than incorporated in it. The same kind of appliances may be used with warm-air furnaces.

Some excellent examples of such installations are shown through the courtesy of the American Nokol Company, Chicago, and the Leader Iron Works of Decatur, Ill.

In adopting such a device for a warm-air furnace, the flue gases from the furnace stack are introduced into the top of the economizer unit and taken out at the bottom. Meanwhile, cool air, drawn in at the base of the unit, is heated by passing through the pipes which are surrounded by the hot flue gases. These pipes terminate in a header at the top of the unit. From the header pipes extend to such rooms as it may be designed to heat.

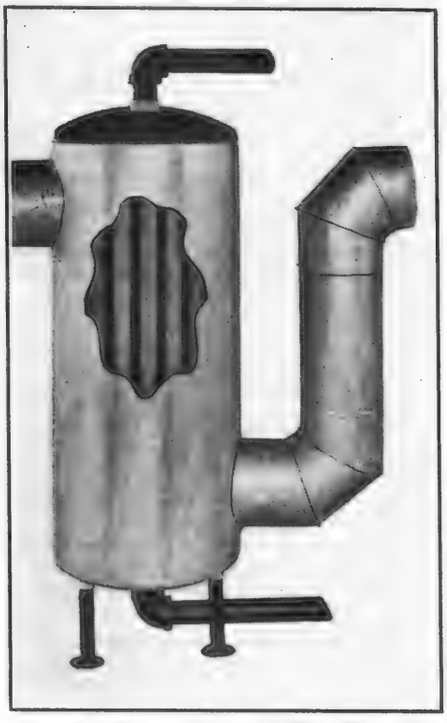
The same general plan is followed with hot water installations except that steel piping is used, instead of sheet and metal piping. In an interesting example of such an application heat is provided for a garage located 200 ft. from the house and so far below the basement level that gravity circulation of hot water was impossible. The economizer in this case virtually acted as a garage heating boiler, except that, instead of having a combustion chamber, it derived its heat from the otherwise waste heat in the stack of the main boiler. In order to secure a proper circulation a small motor-driven centrifugal pump was introduced into the return line of the garage hot water system, the motor being connected in parallel with the motor of the oil burner so that when the boiler started, the circulation was positive.

This whole installation was relatively inexpensive and adequately provided heat for the garage which was nearly one quarter the size of the residence itself.



Installation of Nokol Oil Burner and Leader Economizer, the Latter Heating a Garage with Otherwise Lost Heat

As a justification of the title it must be admitted that had the economizer not been introduced into the installation the heat that was transferred to the garage would certainly have been waste heat.



Leader Economizer for Hot Water System

As a specific example of what has been accomplished the case is cited of a house in an Illinois city consisting of ten rooms, two baths and a hall. This house is equipped with XX Century furnace, a Nokol oil burner and a Leader economizer. All of the heat for a bedroom 18 ft. x 20 ft. and the dining room 16 ft. x 17 ft. is provided by the economizer. The bedroom has seven windows and three exposures and the dining room one exposure and four windows. During the heating season of 1923-1924 local soft coal was used at a total cost of $129, and during the following year the house was heated with oil, with the economizer connected into the circuit, for $133 worth of oil. The owner estimates the economizer increases the efficiency of the heating by 30%.

Chicago Oil Burner Association Adopts Standard Order Form

One of the important functions of any association or business organization would seem to be to secure the standardization of sales contracts, wherever possible, to the end that the members, who are presumably engaged in competitive business, may present to possible customers propositions framed in identical language and covering the same ground, so that the prospective customer may have at least one less variable enter into his comparison.

ORDER FORM APPROVED BY CHICAGO OIL BURNER ASSOCIATION

WINSLOW BOILER & ENGINEERING CO.,
Chicago, Illinois.

Chicago, Illinois..... 192.....

Please furnish and install in the building owned by me at No..... { Av. / St. }
(Buyer's address)

....., Ill.,

Amount

..... No..... Type ..... Kleen-Heet Automatic Oil Burner..... Current ..... $.....

..... $.....

..... $.....

..... $.....

..... $.....

TOTAL $.....

The Seller agrees to make or cause to be made installation of the above described oil burner and equipment at the above mentioned premises on or about..... 192.....

The Buyer agrees to pay the Seller the sum of..... Dollars, $....., as the purchase price of said burner and equipment, payments to be made as follows: $..... with this order, receipt of which is hereby acknowledged, $..... upon completion of the installation of said oil burner and equipment, and a note for $....., payable in ..... installments of $..... each, which note is not given in payment of this obligation, but merely as evidence thereof.

The purchase by the Buyer of oil storage equipment together with installation charges for same represent a separate and distinct purchase from any and all other equipment sold to the Buyer, and shall in no way be deemed a part of other equipment to which it may be attached.

In event of the non-payment of any of the amounts due hereon as above recited, or in the event that the Buyer shall fail to comply with any of the provisions of this contract, then the entire amount due hereon shall at once become due and payable without notice or demand, and the Seller shall be entitled to retain as liquidated damages any and all payments made hereunder. All loss or damage to or by the oil burner or equipment arising from the use or installation of the same shall be borne by the Buyer.

It is understood and agreed that title to said oil burner and equipment shall at its option remain in the Seller until the entire purchase price thereof is paid in cash. It is further understood and agreed that the Seller may waive option to retain title without notice by filing claim for mechanic's lien or otherwise.

It is further expressly understood and agreed by the parties hereto that no agreements, warrantees or representations, either verbal or written, expressed or implied shall be binding upon the Seller, other than those herein contained. It is further understood and agreed that this contract is contingent upon strikes, fires, accidents, or other delays unavoidable or beyond reasonable control, and is binding upon the Buyer immediately upon execution, and on the Seller when approved by the Seller. Receipt of a copy of this contract is hereby acknowledged by the Buyer.

Received this order (signed in Duplicate), and a check for $.....

.....
Sales Engineer

Approved and Accepted:
WINSLOW BOILER & ENGINEERING CO.

☞.....
Buyer

By.....

Business Address.....

Schedule of Payments

$.....due One Month after date.
$.....due Two Months after date.
$.....due Three Months after date.
$.....due Four Months after date.
$.....due Five Months after date.
$.....due Six Months after date.
$.....due Seven Months after date.
$.....due Eight Months after date.
$.....due Nine Months after date.
$.....due Ten Months after date.
$.....due Eleven Months after date.
$.....due Twelve Months after date.

$..... Chicago, Illinois, ... 192.....

For value received, the undersigned (if more than one, then jointly and severally) promise to pay to the order of WINSLOW BOILER & ENGINEERING COMPANY

..... *DOLLARS*

at the time or times stated in the SCHEDULE OF PAYMENTS *hereon, at its office, or at the office of the legal holder of this note, with interest after maturity at the highest legal rate, together with exchange and collection charges at current rates.*

If any installment of this note is not paid at the time and place specified herein, the entire amount unpaid shall be due and payable forthwith at the election of the holder of this note without notice. The acceptance of any installment hereof by the holder after the time when it becomes due as herein set forth shall not be held to establish a custom, or waive any rights of the holder to enforce prompt payment of any further installments or otherwise.

And the undersigned hereby jointly and severally authorize, irrevocably, any attorney of any Court of Record to appear for the undersigned in such court, in term time or vacation at any time hereafter and confess a judgment or judgments without process, in favor of the holder hereof, for such amount as may appear to be unpaid or declared due and payable hereon, together with costs and twenty per cent of the balance due or declared due and payable hereon as attorney's fees, and to waive and release all errors which may intervene in any such proceedings, and consent, to immediate execution upon such judgment, hereby ratifying and confirming all that said attorney may do by virtue hereof.

Name.....

.....

Address.....

Standard Order Form Approved by Chicago Oil Burner Association. Note the Phraseology of the Contract, Which is Carefully Designed to Segregate the Purchase of the Oil Burner and Its Attached Equipment From the Oil Storage Equipment

The Chicago Oil Burner Association has taken a lead in this direction, as the result of the work of a committee appointed to draft a standard order and contract form that can be used by all members of the association. The form as proposed by this committee was adopted at a recent meeting of the association and is now being generally used throughout the Chicago territory.

Defining the Field for Boiler Protection Devices

The recent development by McDonnell & Miller, of Chicago, of a duplex switch which can easily be installed by oil-burner installation crews, for use in protecting the boiler burning oil from the dangers of low water, through control of the oil-burner motor current, has led to inquiries as to why this appliance could not be combined with the M & M duplex water feeder in a single unit. Both appliances are made by the same company.

To answer these inquiries and to explain in detail the application of each device, McDonnell & Miller have issued a timely circular entitled, "Defining the Field for McDonnell & Miller Duplex Water Feeders and Duplex Switches." The circular explains in detail how the duplex switch was designed to meet the demand of oil-burner dealers and manufacturers for a device that would not only protect the boiler from the dangers of low water, through control of the oil-burner motor current, but, at the same time, be easy to install. Oil-burner dealers, it had been found, were rather reluctant to install this type of duplex water feeder themselves, feeling, and rightfully so, that such work properly came within the province of the steam fitter. The duplex switch, it is explained, combines a low-water cut-off with a pressurestat which operates independently over a wide range of pressures. It differs from the duplex water feeder in controlling the oil-burner motor current, instead of the boiler water-line.

A large portion of the circular is devoted to the respective applications of the two units. A combination of the two, the circular points out, would result in too many complicated parts. The duplex water feeder, it is shown, has a distinct field of its own. When heavy oils are burned, for instance, where the ignition is manually controlled, or where gravity types of oil-burners are used, the duplex switch finds little, if any application. In such cases the duplex water feeder is recommended, as well as on all steam boiler installations that depend upon electrically-driven pumps and in systems where part of the steam is wasted. Again, in heating systems where returns from isolated radiators are not piped back to the boiler, the necessity for closely watching the water-line makes the duplex water feeder preferable.

Other uses for the duplex water feeder are in systems using wall radiation and coils or where there are sags in the piping, or where no drips are provided on the headers, when the water-line becomes subnormal because of the large quantities of condensation that are trapped in the system.

The duplex switch has its greatest usefulness in oil-burning systems. To show the ease with which it may be installed, it is stated that it is necessary only to remove the gauge glass, install the duplex glass in the gauge-glass tappings, and reinstall the gauge glass in tappings provided in the body of the switch. The fact that the duplex switch incorporates a pressurestat is mentioned as reducing, to a corresponding extent, the cost of the low-water cut-off feature.

American Society of Heating and Ventilating Engineers

Committee on Air Filter Code

A committee to prepare a code for testing air filters in accordance with a resolution adopted at the recent mid-summer meeting of the American Society of Heating and Ventilating Engineers has been appointed by President Driscoll, with Professor F. D. Rowley, of the University of Minnesota, Minneapolis, Minn., as chairman. His associates are Albert Buenger, St. Paul, and D. M. Forfar, Minneapolis.

Central Conference Committee on School Ventilation

Willis H. Carrier has accepted the position of chairman of the Central Conference Committee on School Ventilation, consisting of seven members, three from the American Society of Heating and Ventilating Engineers, two from the New York State Commission on Ventilation, one from the American Public Health Association and one jointly representing the National Education Association and the American Medical Association. At a recent meeting of the committee, Mr. Carrier's name was presented for chairman and he was unanimously chosen. Those in attendance were: President William H. Driscoll, of the A.S.H. & V.E., Perry West, Professor C.-E. A. Winslow, Dr. Leonard Greenburg and W. H. Carrier.

Matters of policy and procedure under which the committee will operate were discussed at this conference.

Plans for New York Chapter's 1926-1927 Season

Plans for the 1926-1927 season of the New York Chapter were made at a meeting of the chapter's executive committee, held at the Building Trades Club, New York, August 4. Those present were: President, R. H. Carpenter; Treasurer, F. E. W. Beebe; S. L. Goodwin and H. B. Hedges, together with E. J. Ritchie, chairman of the Program Committee, G. A. Dornheim, chairman of the Membership Committee, and A. S. Armagnac, chairman of the Publicity Committee.

It was the consensus of opinion that this year's program should be made up of addresses on general topics, alternating with discussions of technical subjects connected with heating and ventilating. Prominent speakers have been promised for the general talks, although the program has not yet been finally arranged.

The chapter will start its Fall season with a trip to South Norwalk, Conn., where the members will be guests of the Nash Engineering Company. The trip will be made in buses and after an inspection of the plant, the members will be guests of the company at dinner and will make the return trip in the evening.

New Officers of the Kansas City Chapter

Officers elected at the annual meeting of the Kansas City Chapter, held at the University Club, July 5, are: President, F. F. Dodds; vice-president, L. W. Millis; secretary, Frank W. Wise; treasurer, Sidney Pines. Board of Governors, Nate W. Downes, E. K. Campbell and Ralph E. Johnson.

E. D. Hornbrook gave a talk on the merits of certified heating and told of the adoption of the certified heating idea by the Heating and Piping Contractors Kansas City Association.

"Principles and Methods of Heat Saving"

Published as the joint report of the Utilization Committee of the National District Heating Association and the Research Committee of the National Association of Building Owners and Managers, this little book on "Principles and Methods of Heat Saving" is crammed with practical, common-sense information, well substantiated by facts and figures, on the principles and methods of heat saving. As an illustration of the trite and common-sense character of the text, the following is

quoted as a conclusion to the introduction:

"To heat your building economically.

"Shut off steam for the maximum time at night.

"Shut off steam during the day whenever possible. It will surprise you how much of the time you can do this without complaints from your tenants.

"Turn off the heat in unused portions of the building.

"Run separate mains to sections of the building requiring heat for longer periods than the major portion of the building.

"If sections of the building do not respond to the operation as quickly as possible, either separate these sections from the main portion of the building or find the cause of the poor circulation.

"If you have a vacuum system maintain as high a vacuum as possible on the radiators.

"If you have a hot water system keep the water temperature as low as possible.

"Provide some means of good temperature control.

"Have your windows weatherstripped and the frames calked.

"Provide revolving doors or double doors on all entrances.

"See that the entire system responds quickly when steam is turned on.

"See that all sections of the building are being maintained at the proper temperature—have no sections overheated.

"Have all piping covered.

"Keep the heating system in good repair. It is a machine and cannot operate properly with worn parts.

"Do not obstruct your radiation so as to prevent free circulation of air around it.

"Keep your radiation on outside walls.

"Salvage the heat in the condensate—heat water with it.

"Provide the engineer with thermometers, gauges, etc., so that he may intelligently operate your system.

"Make all valves convenient and accessible. Remote control valves are not expensive.

"Keep consistent records and charts.

"Know your system—understand its operation.

"ABOVE ALL DON'T WASTE HEAT."

To indicate briefly the subject matter contained in this report, the following are taken from the chapter headings:

"Losses from the Building.

"Ventilation.

"Short Hour Heating.

"Temperature Control.

"Savings by Changes in Heating Systems.

"Ease and Convenience in Operation.

"Heating Records."

While the report was obviously prepared mainly for those interested in district heating, its text is practically all applicable to individual plant installation and it will furnish instructive reading to anyone interested in securing higher economy from heating plants.

"Principles and Methods of Heat Saving" may be obtained from D. L. Crashill, secretary, National District Heating Association, Greenville, O., at the following prices:

Less than 10 copies . . .	$1.00 each
50 copies to one address . .	.75 each
100 copies to one address . .	.50 each
500 copies to one address . .	.40 each
Over 500 copies to one address	.30 each

A Handbook on Domestic Oil Burning

Under the title of "Handbook on Domestic Oil Burning," the American Oil Burner Association has issued what is described as a tentative edition of a manual devoted to this subject. We read in the foreword that, "except for that high-spirited little publication, *Fuel Oil*, the field is almost without anything that might be called literature of the art." In view of the fact that THE HEATING AND VENTILATING MAGAZINE has published articles and data which go extensively into this subject and is also the publisher of "House Heating with Oil Fuel" by its associate editor, P. E. Fansler, which has achieved a wide acceptance throughout the oil-burning field, it comes as something of a surprise to find that our efforts have been so futile.

A little over one-half of the manual is devoted to heating data, including definitions, explanations and terms, a chapter on heating requirements with special reference to infiltration, another chapter on methods of heating, one on radiators and radiation, one on steam and water heating systems, one on relation of burner to the heating system, one on oil as a fuel, and a chapter on fuel-oil combustion.

The subject proper of the manual begins with a chapter on domestic oil burners. Included in the types presented are those in which atomization is accomplished by the steam jet, and by a high-pressure air or steam nozzle. Which leads one to wonder what is meant by the term "domestic oil burners."

Another chapter is devoted to equipment for oil burners, including automatic electric control, storage tanks for fuel-oil and oil pumps.

Comparative fuel costs are discussed in a separate chapter, followed by a chapter on ordinances and hazards of oil burning. One of the best chapters in the manual is that on "Oil Burning and the Architect."

Singularly enough, the manual contains not a word on the important subjects of installation and service, generally considered to be two of the most pressing problems facing the industry.

The appendix shows a model contract for an oil-burner installation, a uniform warranty, followed by a number of miscellaneous tables.

It is regrettable that so much of the material, which has been taken bodily from other publications, including the *Guide* of the American Society of Heating and Ventilating Engineers and THE HEATING AND VENTILATING MAGAZINE, has no reference to its source. Many of the heating data tables will be recognized as those compiled by A. M. Daniels and published in connection with THE HEATING AND VENTILATING MAGAZINE'S "New Home Study Course in Gravity Steam and Water Heating."

The manual contains the Iso-Oil-Consumption Chart, compiled by P. E. Fansler and duly credited to THE HEATING AND VENTILATING MAGAZINE, in which it appeared in November, 1925. Size 4¾ x 7¼. Pp. 224. Cloth, $2.75 postpaid.

WHAT SMOKE COSTS YOU is the title of a manual issued by the Anthracite Coal Service, Philadelphia, and quoting numerous authorities as to the injurious effects of smoke. The interesting statement made by Samuel D. Flagg, of the Bureau of Mines, is quoted, that "out of approximately 240 cities of less than 50,000, only 12 reported having either a smoke ordinance or an official charged with smoke inspection. Of cities of 50,000 to 200,000, only 17 reported as making more or less vigorous efforts to suppress the nuisance. Of 28 cities having over 200,000 population, 5 are making practically no effort towards smoke abatement." Size 6 x 9 in. Pp. 12.

LIVE IN THE HOUSE THAT GAS HEATS is the title of an interesting folder being circulated by American Gas Products Corp., New York, formerly the A. H. Wolff Gas Radiator Co. These boilers are made in a large number of sizes, having heating capacities, of from 225 sq. ft. to 8000 sq. ft. of steam radiation A.G.A. rating, which contemplates the delivery of 240 B.T.U. per hr. per square foot of steam radiation at boiler outlet. It is interesting to note that the "baby" size, suitable for small homes, occupies a floor space only 15 in. x 19 in. The Ideal, of course, is controlled with master control providing that the gas cannot be turned on until the pilot light is burning; the gas is automatically cut off if the pilot light goes out and the gas is automatically cut off if the water (in steam boilers) falls below the safe level. This is accomplished through a three-function snap valve.

CO-OPERATIVE ADVERTISING is the title of a report just issued by the Policyholders Service Bureau of the Metropolitan Life Insurance Company, New York. The report reviews the methods employed by some of the most successful users of co-operative advertising and draws some interesting conclusions as to the circumstances in which this form of advertising may be used to the best advantage.

Discussing co-operative advertising by competitive manufacturers, the report concludes that this form of advertising is desirable when some outside danger seems to threaten the loss of a market to the entire industry, or when market analysis reveals the possibility of a general increase in sales all along the line.

New Apparatus and Appliances

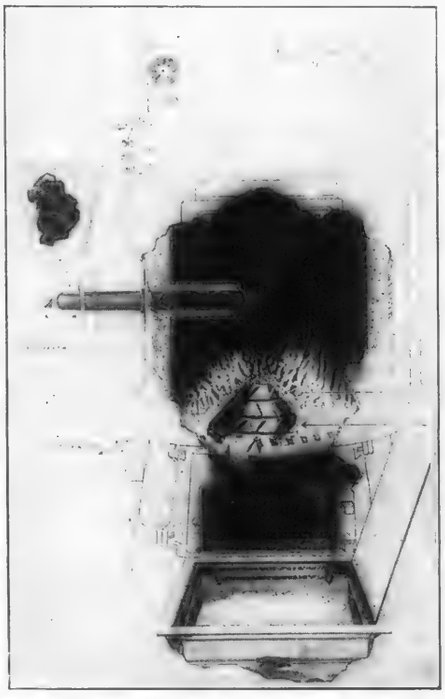
New Domestic Coal-Fired Stoker

Stokescoal, a new coal stoker for domestic use, which automatically feeds the coal and removes the ashes from the firepot, manufactured by the Stoker Co. of America, Philadelphia, has been placed on display at 119 West 42nd St., New York. The stoker is of the overfeed type, with a water-jacketed screw which is fed from a hopper. The water jacket around the stoker is intended to prevent the coal's clogging the device during a respite. The grate is shaped like a hat, with a cone-shaped crown having two rotating sections. These sections are connected to the brim or base grate and to a disc-shaped ash-pan situated directly below the grate. The ash-pan and brim rotate with the grate sections.

Rotating parts of the grate are supported by bearings which are adjusted after the furnace is installed and in operation. Ashes, falling through the openings in the grate are deposited on the rotating pan and are scraped, by a moving lever arm, onto a chute, whence they fall into a removable ash-can located in a pit in front of the furnace. A cast-iron door over the ash pit rests flush with the floor.

A fan supplies the draft for the furnace while the stoker is in operation and permits natural draft to be used when the driving equipment is idle. Air is supplied to the fuel through the base grate and through slits between the stationary and rotating sections of the crown.

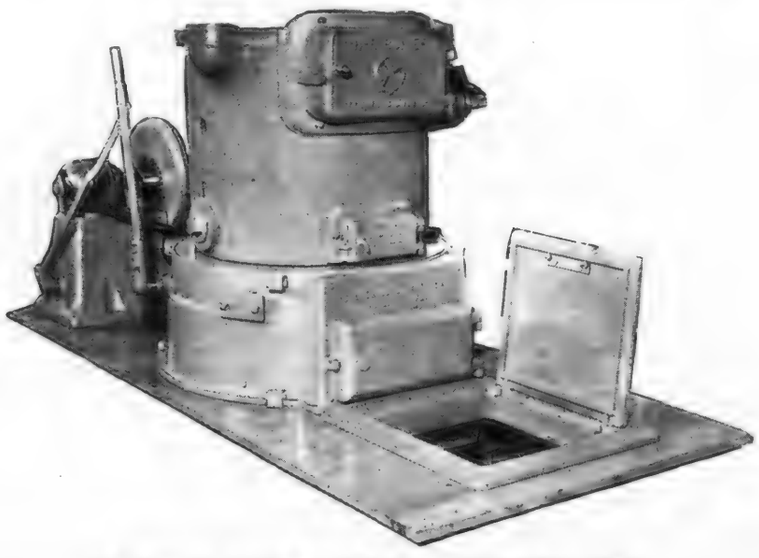
Stoker, grate sections and ash-lever are all moved by an adjustable arm-and-ratchet, operated by a 1/6-H.P. electric motor; the fan is loose-connected to the motor shaft. This motor, which can be connected in the lighting circuit, is automatically controlled by a boiler regulator or by remote thermostatic control equipment. In medium winter weather, the stoker is in operation about one-third of the time.



Section Through Boiler Showing Stokescoal Feed and Grate

Should electric power be cut off, the furnace can be hand-fired and ashes shaken into the pit by means of the lever which, ordinarily, is operated by the motor. An auxiliary motor, which can be readily connected to the drive shaft by a removable coupling, is a part of the standard equipment.

The furnace is designed to burn small sizes of anthracite coal, and it is stated that combustion is so complete that there is less than 8% of carbon in the ash.



Stokescoal Installation Showing Ashpit Door Open

Nelson Gate Valves Again on the Market

Announcement is made by the American District Steam Company that it has taken over the Nelson gate valve patterns for 125 and 250 lbs. pressure, as well as the 400-lbs. pressure Nelson valve. It will be welcome news to many to know that the Nelson valve is again available. Production facilities make it possible for the American District Steam Company to offer prompt shipment.

The Adsco Nelson gate valves, as this product is now known, is the subject of a bulletin (No. 301) issued by the company. The valve consists of two discs carried on a central wedge. The top and side guides are provided to prevent the discs from coming in contact with the seats until the lowest point of travel is reached, thus avoiding the scraping of the disc and seat faces. The discs automatically adjust themselves so as to make a tight seating contact. When the valve is opened, the discs are drawn away from the seat rings before the upward travel begins. The stems are one piece—bronze, with a tensile strength of over 70,000 lbs. List prices and dimensions are given in the bulletin for the Nelson 125-lb. standard iron-body gate valve, for two types of the Nelson gate valve for 250-lbs. pressure, one a non-rising stem double-disc type, the other, a rising stem outside screw and yoke double-disc type; and for a Monel metal mounted Nelson gate valve for 400-lbs. working steam pressure, at 750° temperature. Size of bulletin, 8½ x 10½ in. Pp. 8 (punched for binding).

New Gas-Fired Incinerator

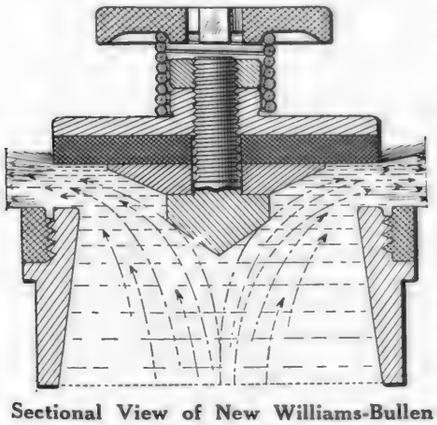
The Kleenburn gas-fired incinerator has been placed upon the market by the Kleenburn Co., Milwaukee, Wis. The individual, portable, gas-fired incinerator is rapidly becoming an article of common household use, and the thoughtful builder of a modern home today buys and installs an incinerator for much the same reason that he turns to gas and oil heat—to eliminate the drudgery of garbage and refuse removal and to enable the maintenance of more sanitary conditions in the home. To meet this demand, the Kleenburn incinerator has been developed. It has a capacity of three bushels and is gas-fired with a 50-cu. ft. burner, Rutz lighter and Time-O-Stat. The incinerator has double walls, with air in-

Kleenburn Gas-fired Incinerator

sulation space, and the grate is of the shaking or revolving type. It is stated that one bushel of refuse or garbage can be converted into a pint of ash in 30 minutes. In operation, with the Time-O-Stat attached, the carbage and refuse for the day are placed in the incinerator, the pilot light button pressed and this lights the burner, which continues in operation until the garbage has been reduced to ash, when the flame is automatically extinguished.

A Stream-Line Pump Valve

A new pump valve is announced by its manufacturers and distributors, the Williams Gauge Co., Pittsburgh, Pa. The valve is made in four parts. Frictional resistance and velocity over the valve seat are reduced by a smooth internal surface, the absence of abrupt turns and the elimination of webs. A Tobin bronze stud is used. The body of the valve is of Government bronze.



Sectional View of New Williams-Bullen Pump Valve

The disc, which is usually made of "Wigaco," can be obtained in any other material suitable for special conditions.

Aetna Anti-Siphoning Device

There has been developed by the Aetna Automatic Oil Burner, Inc., of Providence, R. I., an anti-siphoning device for use in connection with oil-burner installations that is notable because of its simplicity in design and operation.

This device is primarily intended for use in conjunction with oil burners employing a power-driven pump returning the excess oil pumped, over that consumed, back to the supply tank, where ground conditions do not permit the installation of the supply tank below the level of the oil-burner pump.

When properly installed in connection with such oil-burning systems, this device serves as a siphon-breaker, or as a means of preventing siphoning from the supply tank into the building, in case of a line break below the oil level in the tank, thereby minimizing the hazard involved in the use of a supply tank located above the level of the oil-burner unit.

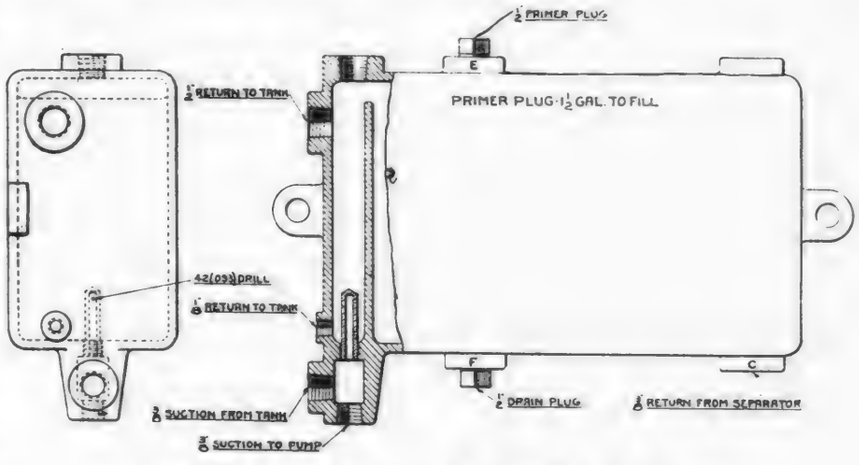
When installed in connection with systems in which the oil-supply tank is located either above or below the level of the oil-burner pump, this device affords an additional safety feature in that where the oil burner is on intermittent operation, with a minimum standby period of 10 minutes, re-establishment of pumping of oil is prevented and a continuous discharge of oil into the building is stopped in the event of breaks in the suction or return lines, permitting a flow in excess of 3 gal. per hour, and where on continuous operation a continuous discharge is prevented from total breaks in either the suction or return lines.

This device is intended to be mounted on a wall or other substantial support and to be installed in the highest point of the pump-suction line from the oil supply tank and of the return line to the supply tank.

A suitable gravity check valve must be installed in the suction line between the pump and the siphon-breaker to prevent the draining of the large chamber during the standby period in the operation of the oil burner. The system is placed in a serviceable condition ready for operation of the oil-burner equipment by priming through the fill opening in the top of the siphon-breaker.

Continental Announces New Radiator

A new radiator, described as classic in name and appearance, has been placed on the market by the Continental Heater Corp., Dunkirk, N. Y., under the name of the Continental Classic radiator. The open design of its columns, it is stated, provides unusually free air circulation, in addition to good interior circulation. It is listed as having full rated radiation surface, yet occupies less floor space than standard radiators. The smooth character of the castings, it is added, provides a flawless surface for any finish.



Aetna Anti-Siphoning Device for Use With Oil Burners

New Anti-Siphoning Valve for Oil-Burning Systems

An ingenious little valve has been developed by the American Schaeffer & Budenberg Corporation, Brooklyn, N. Y., to obviate the need of burying the main storage tank below the level of the burner in domestic oil-burner installations. Previously, this has been impracticable because of the danger of siphoning.

The new valve which is known as the American anti-siphon valve is placed in the line between the tank and the burner at the highest point near the tank outlet and only two connections are necessary—the inlet and the outlet. As soon as the pump starts, the valve opens, due to the suction, and when the suction is broken (because of any break in the line or when the pump stops), the valve closes. Thus, it acts to prevent any flow from the tank by siphon action.

The construction embodies the features of a weight-loaded and a spring-

loaded valve with both the weight and the spring inside the valve body. The weight makes the action positive and the spring makes adjustment possible, in that way securing protection against siphoning, even under various heads.

American District Steam Develops Condensation Meter

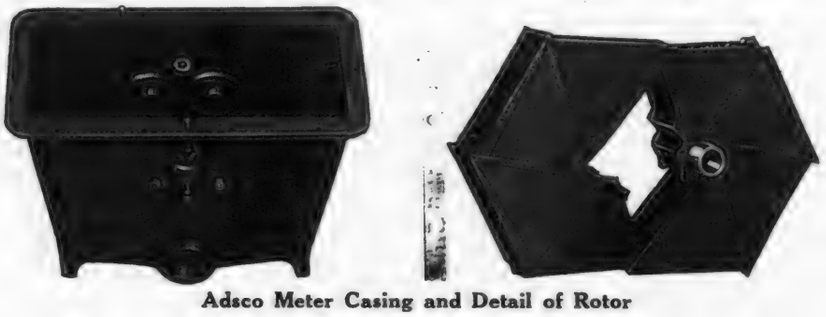
A rotary type of meter, described as accurate, capable of operating under varying loads and so constructed as to be readily taken apart for cleaning, is a recent product of the American District Steam Co., North Tonawanda, N. Y. The body of the meter is made in one section, cast of gray iron, with thin walls to make the device light and easy to handle. The lid is similarly cast and is provided with handles. Sealing is made possible by two castellated nuts, pierced for sealing wires placed at opposite corners of the cover.

The rotor is made of six heavy copper, soldered and riveted, buckets, nesting together around the brass nozzle and bearing. By loosening a few screws, the rotor may be completely demounted and each bucket and compartment cleaned.

Adsco Rotary Condensation Meter

The dial cover is hinged and provided with padlock and sealing wire. To prevent fogging of the glass, the cover is fluted to permit air-circulation.

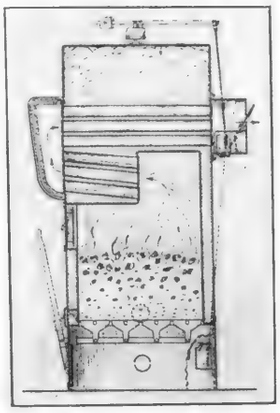
This meter is described as suitable for vacuum or gravity system service. The body is made air-tight and the driver, which transmits revolutions of the rotor to the dial mechanism, is set in a special brass bushing to prevent air leaks.



Adsco Meter Casing and Detail of Rotor

A New Oil or Coal Steel Boiler

Something new in the way of a steel boiler designed to burn oil or coal has been brought out by the Lebanon Boiler Works, under the name of the Lebanon "Oil-or-Kol" steel boiler. The boiler is electrically welded and is featured as having one rating only to a grate; that is, the company has assigned only one steam radiation capacity for a given size grate. The steel tubes used in the boiler are extra heavy. In addition, copper steel is utilized throughout. Among other points, the company emphasizes the fact that this boiler is easy to inspect and is easy to fire and clean. It is shipped complete. The boiler is adaptable for either steam, vapor or water heating.



Section of Oil-or-Kol Steel Boiler

New Model Thermotrol

A new model of the Thermotrol, a self-contained temperature regulator for direct steam radiation, manufactured by the Sterling Engineering Co., Milwaukee, Wis., has just been placed upon the market.

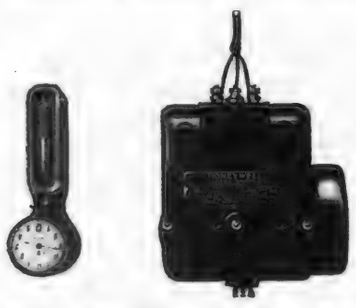
This control consists of a nest or group of highly sensitive diaphragms, so housed and connected to a valve as to insulate the diaphragms from the direct heat of the radiator, making it possible for them to accurately reflect the temperature conditions of the room atmosphere and to regulate the flow of the steam through the valve to the radiator accordingly. This regulation has been developed to a point where the control will maintain room temperatures with an accuracy of from 2° to 3°. By means of a knurled knob, the Thermotrol may be set at any desired temperature and a concealed locking device provides against this setting being tampered with.

The device can be attached to either a steam or hot water radiator, either at the top or bottom. It is manufactured in three sizes, from ¾ in. to 1½ in., having capacities from 70 to 250 sq. ft. of radiation at 8 oz. steam pressure. The Thermotrol is very simple in its design and is so ruggedly constructed that there is little chance of its getting out of order.

Damper and Furnace Fan Control

Automatic control of a warm-air furnace fan of the type manufactured by the Warm Air Furnace Fan Co., 6511 Cedar Ave., Cleveland, and, with the same operation, control of the furnace dampers, has been made possible through the application of the Honeywell Type DS motor switch, equipped with shaft extensions and crank arms.

The motor switch is actuated by a Honeywell room thermostat. When the thermostat signals the motor switch that heat is desired, the furnace fan is started by the completion of the circuit to the fan through the switch mechanism. At the same time the dampers are operated by means of chains attached to the crank arm on the motor-switch shaft extension.



Honeywell Controls for Warm Air Furnace Fan Co.

In this way, both the room temperature regulation and the forced circulation of air through the furnace are controlled.

The New Hays Pointer Draft Gauges

In a new line of pointer draft and pressure gauges perfected by the Hays Corporation, Michigan City, Ind., simplicity of operation has been secured by confining the mechanism essentially to a slack leather diaphragm, a phosphor bronze cantilever spring and a pointer mounted on a pivot bearing which is attached to the spring by a nickel-silver bead chain. The arrange-

Fig. 3. Phantom View of Type V, Showing Operating Mechanism

ment is shown in the phantom view, Fig. 3.

The diaphragm is described as a pliable, tough, gas-tight animal membrane which the Bureau of Standards has found to be particularly suitable for this service. The diaphragm transmits the force of the draft or the pressure to the flat bronze spring, which in turn moves the counterweighted pointer on its pivot. This action produces a reading on the scale in direct proportion to the magnitude of the force acting upon the diaphragm.

It will be evident that the position of the spring determines the position of the pointer and the spring is moved in proportion to the magnified force applied through the slack leather diaphragm. The movement is smooth and deadbeat so that there is no occasion for dashpots or dampeners.

The gauges are made in two types. Where one or two scales are required, Type F, shown in Fig. 1, is recommended, but where a number of pressures have to be read simultaneously, as in the control of mechanical stokers using forced draft, Type V, shown in Fig. 2, is the instrument used. Any desired number of scales may be grouped in a single case to meet the requirements of an individual plant. In either type, the principle of operation is the same.

All gauges are direct reading. They can be calibrated for a total scale range of ¼ in. up to 30 in. of water pressure, using the standard diaphragm mechanism, and any differential range within these limits can be handled for either draft or pressure. A slightly different mechanism handles high pressure ranges, with the scale calibrated in pounds per square inch.

In the Type V gauges, scales measuring 12 in. long and 2½ in. wide are provided with large, plain black figures. Bright red indicating arrows and a translucent illuminated scale of long radius improves the visibility so that readings may be taken from distances of 100 ft. and over a wide angle of vision. The cases are moisture and dust-proof and aluminum covers are used to protect the leather diaphragm.

A folder issued by the company describes methods of adjustment, methods of mounting, the wiring connections and principles of operation of these instruments. Both Type F and Type V gauges are equipped with show-case type bulbs. In the Type V gauge, the bulb is within the case. The folder describes also Hays Vernier draft gauges, inclined-tube draft gauges, portable test and direct-reading gauges.

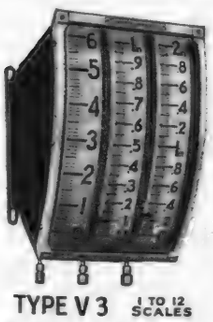


Fig. 2. Three Scale Gauge of the V-3 Type

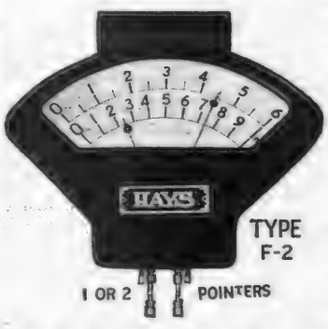


Fig. 1. Type F-2 Hays Double-Pointer Gauge

Pulverzone Burns Standard Screenings

A new mechanism for handling standard screenings, either wet or dry, has been devised by the CoKal Stoker Corp., Chicago, and is being marketed under the trade name, Pulverzone. This is a development of the CoKal Stoker and it would appear to incorporate several interesting and distinctive features.

The CoKal stoker, as the phrase implies, consists of a patented grate arrangement, automatically fed with screenings and designed to coke the coal and then burn it as coke. This is done by supplying the coal to the front of the stoker, coking it and then distributing the coke over the surface of the stoker in such a manner as to eliminate holes in the fire.

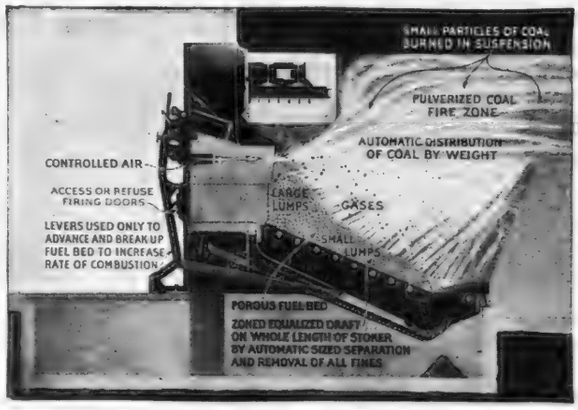
The grate inclines to the rear and the screenings are fed to the front and higher end by means of a plunger working under the coal hopper. The action of this plunger deposits the coal in such a manner that coking is accomplished above the upper end of the grate. The action of the grate moves the coal downward and rearward, the heat becoming more intense and the volatilization increasing until finally, all of the volatiles having been burned, the remaining coke is in a zone of intense heat just above the bottom of the grate. The last section of the grate is a dumping plate through which the ash is discharged.

PULVERZONE INCORPORATES SOME FEATURES OF PULVERIZED COAL FURNACE

The newest development consists of the introduction of a controlled jet of compressed air just below the lip over which the coal is pushed by the feeding plunger. It is evident that with a given air pressure behind this jet, the lighter particles of coal will be blown out into the combustion chamber to burn in suspension, being volatilized in its passage through the combustion chamber. The smaller particles will be blown out over the grate and will be deposited at varying distances according to their weight. The large lumps will not be affected by the jet and will fall onto the top section of the grate, where they will coke in the manner just described.

Such excess air as may be required to carry on combustion at a high rate is automatically supplied.

It is stated that Pulverzones are being operated under such conditions that boilers show outputs as high as 350% rating and with gas analysis showing 12½%, 14½% CO_2 at this rating. The Pulverzone is designed particularly for return—tubular and water—tube boilers from 50 to 2000 H.P. It is stated that less than 2% of the boiler rating is required for power-feed of coal and for the air jet. It is also claimed that this equipment will burn standard screenings without smoke and without involving an explosion hazard.

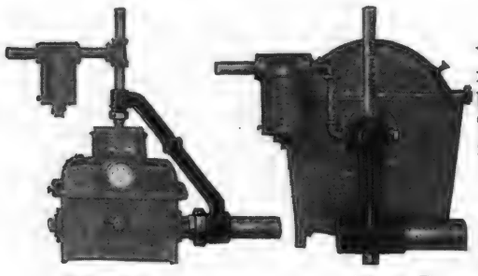

SMALL PARTICLES OF COAL BURNED IN SUSPENSION
PULVERIZED COAL FIRE ZONE
AUTOMATIC DISTRIBUTION OF COAL BY WEIGHT
CONTROLLED AIR
ACCESS OR REFUSE FIRING DOORS
LEVERS USED ONLY TO ADVANCE AND BREAK UP FUEL BED TO INCREASE RATE OF COMBUSTION
LARGE LUMPS
GASES
SMALL LUMPS
POROUS FUEL BED
ZONED EQUALIZED DRAFT ON WHOLE LENGTH OF STOKER BY AUTOMATIC SIZED SEPARATION AND REMOVAL OF ALL FINES

How the Pulverzone Handles Screenings

The Adsco Meter Manifold

A new device, developed to facilitate the installation or removal of condensation meters from heating systems, has been brought out by the American District Steam Co., North Tonawanda, N. Y., under the name of the Adsco meter manifold. It is a simple cast-iron device, webbed for rigidity and light weight, provided with tappings, properly spaced, to hold inlet and outlet piping in proper alignment with the meter connection. These tappings are arranged to allow connection of piping from either side. The manifold is equipped with unions to simplify installation.

The manifold can be installed in new buildings, thus relieving the central heating companies of inconvenience when it is time to install a meter. Old buildings may be similarly equipped, thus facilitating the removal of meters in the spring and subsequent re-



Type A Type B
Adsco Meter Manifolds

installation after cleaning and repairing. The manifolds are available for all sizes of condensation meters.

Small "Efficient-Heating" Boiler Shows High Efficiency

Data on a test recently conducted at the Union Stock Yards, Chicago, by R. D. Cooper on an "Efficient-Heating" boiler, rated at 10 H.P. and burning oil in a Rayfield burner, are furnished by the Efficient-Heating Boiler Co., Chicago. This boiler was described in THE HEATING AND VENTILATING MAGAZINE for November, 1925, and is essentially of the Babcock & Wilcox type.

DATA AND RESULTS OF EVAPORATIVE TEST ON "EFFICIENT—HEATING" BOILER, SIZE NO. 1

Object of test—to determine efficiency of boiler and burner

Kind of Burner	Rayfield No. 1
Date of test	April 9, 1926
Duration of test, hrs	3¾
Kind of boiler	Size No. 1
Kind of fuel	Fuel-oil
Heating surface of boiler, sq. ft	131.8
Grate area, sq. ft	3.33
AVERAGE TEMPERATURES, PRESSURES, ETC.	
Steam pressure gauge, lbs	2
Temperature of feed water, deg. F	41
Temperature of flue gas, deg. F	256
CO_2, per cent	11.7
Gravity of oil at 60° F., Deg. Baumé	28.9
Calorific value of oil per pound, B.T.U	19003
TOTAL QUANTITIES	
Weight of fuel oil burned, lbs	83.25
Fuel-oil burned, gal	11
Weight of water fed to boiler, lbs	1074
Factor of evaporation	1.175
Equivalent evaporation from and at 212° F., lbs	1262
AVERAGE HOURLY QUANTITIES	
Weight of fuel-oil burned, lbs	22.2
Fuel-oil burned, gal	2.94
Weight of water fed to boiler, lbs	287
Equivalent evaporation from and at 212° F., lbs	337
ECONOMIC RESULTS	
Weight of water fed to boiler per pound of oil, lbs	12.9
Equivalent evaporation from and at 212° F., lbs	15.2
Rating of boiler in horse power, B.H.P	10
Actual horse power developed, B.H.P	9.8
Percent of rating developed	98
Cost of fuel oil per gallon, cents	7
Cost of oil to evaporate 1000 lbs. of water from and at 212° F., cents	62.5
Efficiency of boiler and burner, per cent	78
Radiation load developed on a basis of 240 B.T.U. per square foot, sq. ft	1360

This test was conducted by R. D. Cooper, B.M.E., (Mem. A.S.M.E.), Chicago, Ill.

Underwriters Announce New Listings

Last-minute advices from the Underwriters' Laboratories dated July 25, announce the listing of the following oil burners, released since the last issue of THE HEATING AND VENTILATING MAGAZINE went to press:

DOMESTIC BURNERS

Vesta, Type D, J. S. & J. F. String, Inc., 263 Washington Ave., Newark, N. J. Mechanical draft, with a.c. or d.c. motor drive, automatic control, gas pilot ignition; for oil fuel not heavier than 32° A.P.I.

Homer, Type H, Homer Oil Burner Corp., West Townsend, Mass. Mechanical draft, with a.c. or d.c. motor drive. Automatic temperature control; for oil fuel not heavier than 32° A.P.I.

Sword, Model L, Sword & Kimber Co., Philadelphia, Pa. Mechanical draft, with a.c. or d.c. motor drive, automatic temperature control, gas pilot ignition; for oil fuels not heavier than 36° A.P.I.

INDUSTRIAL BURNER

Simplex, Type U, Bunting Iron Works, 6th & Parker Sts., Berkeley, Cal. Mechanical draft, manual ignition; for oil fuels not heavier than 140° A.P.I. preheated when necessary.

"The Master Furnace Man" Forms Backbone of Electrol Campaign

An advertising campaign that is outstanding, even in comparison with the most lurid splurges of the last year or so, has been inaugurated on a nation-wide basis by Electrol, Inc., of St. Louis.

The backbone of this campaign is the slogan "Electrol—The Master Furnace Man." The campaign is being carried out in large displays from one to four pages in color, in the *Saturday Evening Post*, the *Literary Digest*, THE HEATING AND VENTILATING MAGAZINE and *Fuel Oil*.

The Electrol organization has been working very quietly for several years, always with its feet on the ground and, having brought the burner, which is based on the Scott-Newcomb System, to a high state of development, is now going out after sales on a national basis. The entire business-getting campaign has apparently been carried out with extreme care and the corporation is undoubtedly prepared to back up its representatives in a very substantial manner. The copy to be used in this campaign is outstanding in its dignity and is in conformity with the code of ethics developed by THE HEATING AND VENTILATING MAGAZINE during the last few months.

Night Cut-Out Temperature Control

In sections of the country where the temperature variation is slight, a room thermostat with night cut-out is being used with economical results.

In commenting on the use of these instruments, the Honeywell Heating Specialties Co., Wabash, Ind., which manufactures such a device, states that a night cut-out thermostat effectually prevents the operation of the heating plant during the night period, automatically closing it down at the retiring hour, keeping it down all night regardless of temperature conditions and automatically returning the temperature to the desired point in the morning. The saving in fuel is evident.

Also, in certain sections of the country, heat may be required only at given periods during each day. Through special cams on one type of device, known as the Honeywell clock thermostat, it is possible to supply heat during these periods, keeping the heating plant at a low level at all other times.

This application works very nicely in cases where the home owner is away from home at stated intervals. Cams can be furnished so that the clock thermostat will allow heating to be produced for a short period in the morning, reducing it at a stipulated time and then returning at a stipulated time in the late afternoon or evening. The applications here described, it should be noted, are only successful in connection with oil and gas-burning installations.

New Trade Publications

THE FIRST 25 YEARS appears on the cover of a catalog marking the twenty-fifth anniversary of the National Regulator Co., Chicago. The catalog is largely pictorial, showing buildings in which the National system of temperature regulation has been installed. Under the caption, "Our First Large School" is told the story of the equipment of the Elgin High School in 1905. The statement is made that "the system is giving perfect service to-day. It has always been in order and has never required any expensive 'service' or repairs. Carefully-kept records show that the entire upkeep expense of the original installation has amounted to less than $100.00 in twenty-one years."

There is also pictured, "Our First Large Office Building," the Scarritt Building, Kansas City, which was equipped in 1908. A letter from the chief engineer of the building states that he has not had to buy any replacements in the past sixteen years. Another important installation, noted under the head of "Our First Large Hotel," was The Blackstone, Chicago. There follows a score of pages on which are pictured buildings equipped with National temperature control, and the last four pages are given up to an imposing list of buildings in almost every State in the Union. The catalog is excellently gotten out and well carries its pertinent message. Size 8½ x 11 in. Pp. 24.

INTERNATIONAL ECONOMY SMOKELESS BOILERS are described in a six-page folder issued by the International Heater Co., Utica, N. Y. The folder is devoted to the mixing-arch type of boiler. The text describes the method of utilizing the mixing arch to more intimately mingle the secondary air with the unburned gases, while the illustrations comprehensively supplement the text. The last page contains data on this type of boiler in sizes ranging from 837 sq. ft. of radiation load to 5100 sq. ft.

TACO SEMI-INDIRECT WATER HEATERS are featured in a circular issued by Thermal Appliance Co., Inc., New York. These indirect water heaters consist of a cast-iron shell, with headers, containing a series of vertical copper tubes. The service water circulates through the copper tubes and is heated by the boiler heater or steam circulating through the shell. There are two connections below the water line permitting the constant circulation of boiler water; one connection above the water line for the admission of steam. An air-valve tapping on the upper portion is provided for the elimination of air. The inside of the circular shows a skeleton map of New York City and vicinity marked to indicate 29 installations of Pecco heaters in apartment houses and similar large buildings, six of which are shown in photographs. Taco heaters are built in eight sizes, having capacities with steam from 50 to 2000 gal. of water per hour heated to 80° temperature.

ALLEN MULTI-VANE TURBINE VENTILATOR appears on the cover of a small pocket catalog describing the product of the Allen Air-Turbine Ventilator Co., Detroit, Mich. The catalog contains a large number of photographs of installations, many of which are quite impressive and as a whole, indicative of a wide scope of application. It is claimed that many problems of air removal can be solved with this system that will obviate the use of power, and the catalog states that all of the rated capacities given in the catalog are conservative and guaranteed. The ventilator is built in 11 sizes, ranging from 8 in. diameter at the base to 48 in. diameter, with capacities, based on 4-mile wind velocity, ranging from 17,000 cu. ft. per hour to 360,000 cu. ft. All necessary data and dimensions are given in the catalog. Size 4 x 9 in. Pp. 24.

ELECTROZONE WATER STERILIZERS are described in a folder issued by the Air Conditioning and Engineering Co., St. Louis. The circular describes the equipment in the Beaumont High School, St. Louis, which has been installed for the purpose of keeping water in the swimming pools pure. It is stated that, with this equipment, but 3 K.W.H. per day is required to maintain 40,000 gal. of water in a sterile condition. This would be less than 25c with current at 8c per K.W.H. against a cost of refilling such a pool of about $30. Size 8½ x 11 in. Pp. 4.

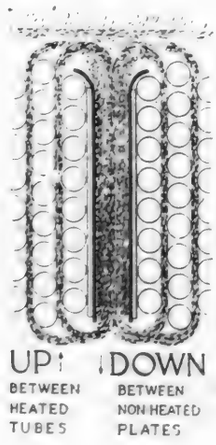
Striking Installation of Allen Turbine Ventilators

FOR CLEANLINESS HEAT YOUR HOME WITH GAS appears as a slogan on the cover page of the Peoples Gas Club News, published monthly by the Peoples Gas Light and Coke Company, Chicago, Ill. The cover is a reproduction of large posters now used on the elevated station platforms in Chicago. The design used with the slogan is a Dutch scene as if done in tiles and the idea is futher carried out by adopting a Delft blue and white color scheme

Gas Posters Used in Chicago

POWERS HIGH PRESSURE STEAM TRAP is described in a folder issued by the Powers Regulator Co., Chicago. This trap is built in ⅜-in. and ½-in. sizes for pressures from 5 to 125 lbs. per square inch. Incorporated in the discs are Monel metal valves, easily replaceable, and the Monel metal thermostatic discs are guaranteed not to cave in or collapse.

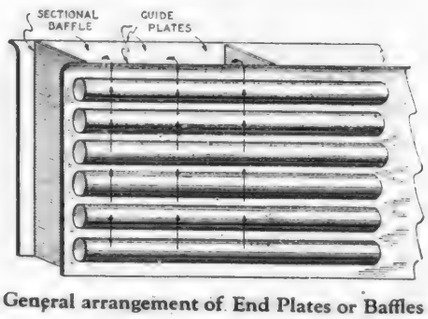
NUWAY BOILER is interestingly described in a bulletin issued by the Nuway Boiler and Engineering Co., Chicago, the presentation being somewhat out of the ordinary. The arguments for this particular design are well and convincingly done, both in story and picture. A cartoon on the cover page is used to emphasize the basic principle underlying the design of this boiler, that of so arranging the tubes that a one-way circulation is secured. The Nuway company also incorporates a folder with its letterhead in which are shown some interesting diagrams of boiler performance, including records of CO_2, flue-gas temperature, boiler pressure and steam flow. These boilers are made in sizes from 50 to 350 H.P. and are built according to A.S.M.E. boiler code.



Diagrams Illustrating Claims for Nuway Boiler Efficiency

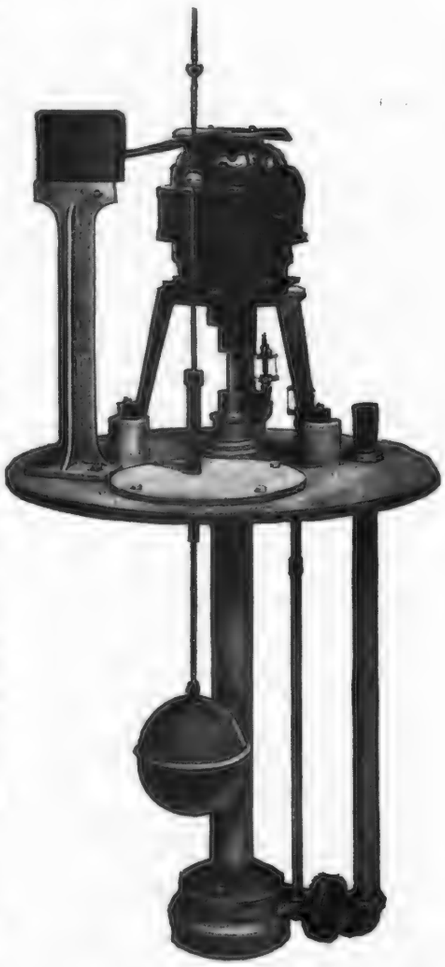
JOHNS-MANVILLE SERVICE TO INDUSTRY, comprising much technical material for the use of the industries served by Johns-Manville asbestos products, has been issued by Johns-Manville, Inc., New York. After telling the story of asbestos, the manual takes up the various types of insulation made by the company, discussing fully what materials are best suited to various applications. The information includes covering sizes, capacities, etc. In addition to the section on insulation, there are sections on refractories and cement specialties, packings, friction blocks and brake band linings, steam traps, asbestos roofings, asbestos wood and other products. Much of the technical material is gathered into an appendix containing, also, tables on heat losses, steam tables, explanations of the use of various tables and other material which go to make up a practical handbook on the subject. No expense has been spared, apparently, in making the illustrations interesting and easy to understand. Line drawings for imparting information of a technical character run throughout the pages, together with elaborate wash drawings and retouched photographs, showing the products and their application. The manual is printed on heavy enamel paper. Size 9 x 12. Pp. 260.

BABY CONOIDAL FANS are described in a bulletin being distributed by the Buffalo Forge Co., Buffalo, N. Y. These fans, first built twenty years ago for ventilating a small testing room, are now on the market in sizes capable of handling from 80 cu. ft. per minute to 7000 cu. ft. per minute. They are used for ventilating, exhausting, supplying draft to oil burners and numerous other uses of this character. A second bulletin of the Buffalo Forge Company describes the Type "FB" variable and constant-speed electric blowers.



General arrangement of End Plates or Baffles

YEOMANS CENTRIFUGAL PUMPS in three types are described in bulletins S-120, S-130 and B-311, just issued by Yeomans Brothers Co., Chicago. The first bulletin describes a single-stage, open-impeller pump, direct connected to an electric motor of the necessary size and type. These are built in a number of sizes having capacities from 10 gal. per minute to 550 gal. per minute and operate against heads up to 140 ft. Another bulletin describes the single or multi-stage horizontal centrifugal pumps for general service, built in from one to five stages, with the same range in capacities as the type described in the first bulletin. Pumps of this type are capable, in some cases, of operating against heads as high as 440 ft. The third bulletin describes the junior drainage pump, designed to pump clear water from basements, boiler rooms and other areas below the sewer level. These pumps are automatically controlled through a float-controlled switch and are designed for maximum head of 20 ft., the corresponding capacity being 35 gal. per minute.



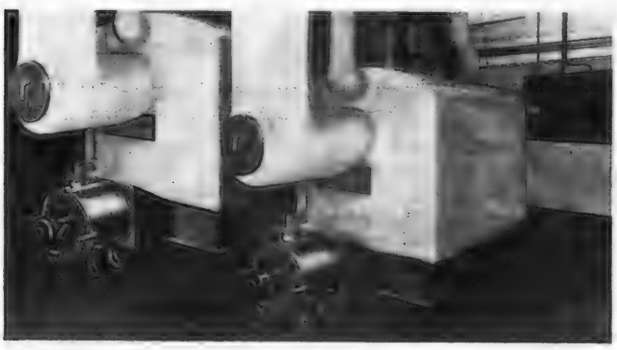
Yeomans Automatic Centrifugal Pump

HEAT FROM OIL is the title of a catalog issued by the Kerrihard Co., Red Oak, Iowa. A foreword makes the statement that the coming heating season will be the fourteenth since the manufacture

of the first Kerrihard burner. The company also builds a vertical water-tube boiler especially for use with oil burners and manufactured in capacities from 300 sq. ft. of steam radiation to 1350 sq. ft. To complete the combination, radiators of pressed Armco iron with welded seams are built. The catalog also features the Kerrihard system of vapor steam heating. Catalog 5½ x 8 in. Pp. 24.

GORTON & LIDGERWOOD trade price sheet, effective July 26, 1926, has been issued covering Gorton quarter-turn packing-lock radiator valves and specialties for Gorton single-pipe vapor heating system.

WING TYPE-EM VARIABLE SPEED BLOWER is described in Bulletin 36, issued by L. J. Wing Mfg. Co., New York. This catalog covers motor-driven, forced-draft units designed particularly for use with low-pressure heating boilers when burning low-grade coal. Several types of installation are shown with the blower attached to both brick-set and cast-iron boilers. Tables of capacities at various static pressures and dimensions are included. Size 8½ x 11 in. Pp. 8.

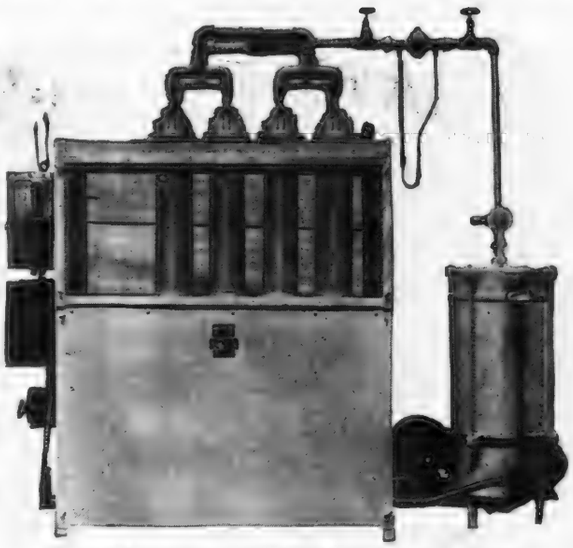


Double Installation of Wing Blowers for Forced Draft

MIXING-ARCH TYPE ECONOMY SMOKELESS BOILER, which will be fully described in the Smokeless Boiler Catalog, soon to be issued by the International Heater Co., Utica, N. Y., is outlined in a data sheet now being sent out by that company. This covers the sectional, round and smokeless boilers manufactured by the company. A data sheet is also attached showing the heating surface per section for the different types.

PUROX WELDING AND CUTTING APPARATUS is discussed in a new catalog issued by Purox Co., Denver, Colo. This catalog describes the oxwelding process, welding and brazing torches for use with oxygen-acetylene gas and many specialties developed to meet the rapidly-increasing requirements for equipment in this field. The catalog is voluminously illustrated and contains cuts and detailed descriptions of all of the apparatus manufactured by this company. Size 8 x 10½ in. Pp. 64.

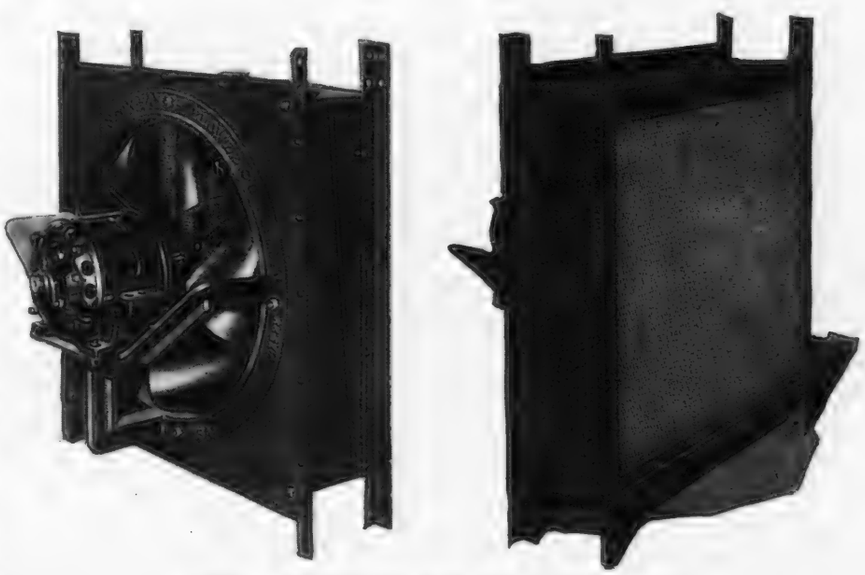
PERFORMANCE IN AIR appears on the cover of a little circular being mailed by the United States Ozone Co., Chicago. This folder features the equipment used in the New Madison Square Garden, New York City, where 30,000,000 cu. ft. of ozonized air are recirculated every hour to provide comfort for nearly 40,000 occupants.



Ozone Equipment for Madison Square Garden

JOHNSON UNIT HEATERS is the title of an interesting and typographically excellent catalog, issued by the Johnson Fan & Blower Co., Chicago, and devoted to general and specific data on Johnson unit heaters. These heaters employ a propeller-type fan, and copper-cartridge type radiators similar to those used for airplane work. It is stated that, due to the construction of this type of radiator, practically 100% of its surface becomes effective area. It is also stated that, in spite of the apparently delicate structure of these radiators, they have been subjected to a temperature of 0° for 48 hours without rupture; also they have been tried under an alternation test for 55,000 cycles, consisting of a steam pressure of 20 lbs. for one minute, alternating with 20 in. of vacuum for the next minute. Johnson unit heaters are also made with a blower-type fan for both heating and ventilating. They are essentially of the ceiling type but may be arranged as a floor-type heater, if desired. The catalog is voluminously illustrated with drawings and diagrams indicating the economies of this type of heater over direct radiation, and the latter half is occupied with detailed specifications of the various types and sizes. Size 8½ x 11 in. Pp. 36.

PECCO UNIT HEATERS is the subject of a catalog just issued by Pecco, Inc., St. Louis, Mo. In a foreword it is stated that this booklet presents three outstanding features of Pecco unit heaters; first, evidence of correct design; second, construction in accordance with the latest approved mechanical practices, including many features developed exclusively by Pecco; and, third, a record of satisfied users in a wide variety of industries and conditions throughout the United States. There follow details of the design and construction of the heaters.



Pecco Unit Heaters with Propeller-Type Fan

Front and Rear Views of Pecco Blower-Type Unit Heater

A BOILER FOR EVERY HEATING DEMAND is the title of a folder being mailed by the General Boilers Co., Waukegan, Ill., and describing Pacific steel heating-boilers. The folder illustrates a three-pass oil-fired boiler, one of the smokeless type, a direct-draft boiler, a steel boiler particularly designed for residences and a down-draft boiler. On the inside of the circular are pictures and reproductions of a number of letters from owners of Pacific boilers testifying to their desirable features and to economies effected. A second circular, dealing specifically with the adaptability of the small Pacific boiler to residences, shows a boiler with 400 sq. ft. capacity, based on 7-hr. firing periods, using soft coal, and occupying but 14 sq. ft. of floor space. This boiler is designed to pass through a 32-in. doorway.

WHEELER CONDENSERS is the title of an exceptionally fine piece of literature being sent out by the Wheeler Condenser & Engineering Co., Carteret, N. J. This company has for many years been a leader in specializing in condensers and auxiliary equipment and the catalog contains a wealth of material, both theoretical and practical, covering all of the phases of condenser design, construction and operation. The catalog is replete with photographs of Wheeler installations, including a condenser of nearly 50,000 sq. ft. surface, direct-flow single-pass, for the new 60,000 K.W. turbines at the new East River station of the New York Edison Company, this being the largest single-pass condenser in the world. There is a very interesting chapter on metallurgy, in connection with the tubes used in condensers, and another devoted to the characteristics of centrifugal pumps. One section deals with jet condensers and another with steam-jet air-pumps. Taken as a whole, the catalog is a veritable encyclopedia on the subject, and after reviewing it, it becomes evident why so many engineering schools use catalogs of this character, rather than text books of the old-fashioned kind. A section of the catalog is devoted to Wainwright expansion joints. The typography is exceptionally fine and the book is printed upon heavy plate paper. Size 8½ x 11 in. Pp. 88.

DUBE COMBINED WATER HEATER AND GARBAGE BURNERS for any kind of fuel, are described in an illustrated pamphlet received from the Dubé Boiler Works, 1244 East Seventy-third St., Chicago. A double shell, made up of two layers of steel boiler-plate forms the housing of the burner. The garbage grate, which is located above the fuel door, consists of staggered boiler-tubing fastened by being expanded into openings in the inner shell. Water circulates through the tubing and prevents injury to the tubes due to the heat. Tubes may be cleaned by removing cleanout plugs located in the outer shell opposite the ends of each tube. Two regular types and one special type of burners, the last for flat buildings and bungalows, are treated, and tables of their sizes, capacities and dimensions given.

THE HEAT-O-LINE is described in a new catalog issued by Heating Systems and Supply Co., Chicago. This company has developed blower-warm-air furnace combinations to fit specific requirements and also furnishes fan equipment to be attached to existing furnaces. A complete line of propeller-type direct-connected exhaust fans is also described. These range from 12-in. to 36-in. sizes, capable of handling from 900 to 13,000 cu. ft. of air per minute. The company has also developed a special type of warm-air furnace for use with oil burners. These furnaces have combustion chambers built of locomotive-firebox steel, welded throughout, and are equipped with Heat-O boosters, providing for mechanical circulation of warm air whenever the burner is in operation. The catalog contains illustrations showing how this furnace may be adapted to different types of oil burners. The same general type of furnace is supplied for use where gas is to be burned. Size 9 x 6 in. Pp. 24.

Deaths

WILLIAM B. REED, vice-president and general sales manager of the H. B. Smith Co., Westfield, Mass., died August 5 at Edgartown, Martha's Vineyard, Mass. Mr. Reed was 57 years old. He was a past president of the National Boiler and Radiator Manufacturers' Association and was a member of the American Society of Mechanical Engineers.

SAMUEL WRIGHT, Buffalo, N. Y., a well-known heating contractor of that city and a former director and vice-president of the Heating and Piping Contractors National Association, died at his home in Buffalo, July 8. He was 55 years old. During 1911 to 1913, Mr. Wright was president of the State Association. He became a director of the National Association at the same time and was elected vice-president in 1913.

T. M. MURPHY, Chicago, president of the Murphy Plumbing Co., of that city, and a former president of the National Association of Master Plumbers, died at his home in Chicago, August 3. He was 65 years old. Mr. Murphy had a host of friends in both the heating and plumbing industries. He had a ready wit, which stood him in good stead at conventions of his industry, where he was known as a master of debate and a keen parliamentarian. Practically all of Mr. Murphy's career had been spent in Chicago, where he developed a large business, specializing in school and factory work.

YEARBOOK OF THE AMERICAN ENGINEERING STANDARDS COMMITTEE for 1926 has been issued. The first section is devoted to the outstanding developments in A.E.S.C. work during 1925, with an outline of its purpose and organization. Among the projects listed on which the committee is now engaged are: Identification of piping systems, safety code for mechanical refrigeration, pipe flanges and fittings, ventilation in coal mines, ventilation in metal mines, ventilation safety code, with safety standards for the construction and operation of mechanism and devices for such conditioning and renewal of air as to tend to render it fit for human respiration; also, safety code for exhaust systems. Size 7¾ x 10 in. Pp. 76.

Present Accepted Practice in Domestic Oil Burners

22. Arrow. *Venturi Atomizing, Mechanical Draft, Electric Ignition*

Previous articles in this series are:

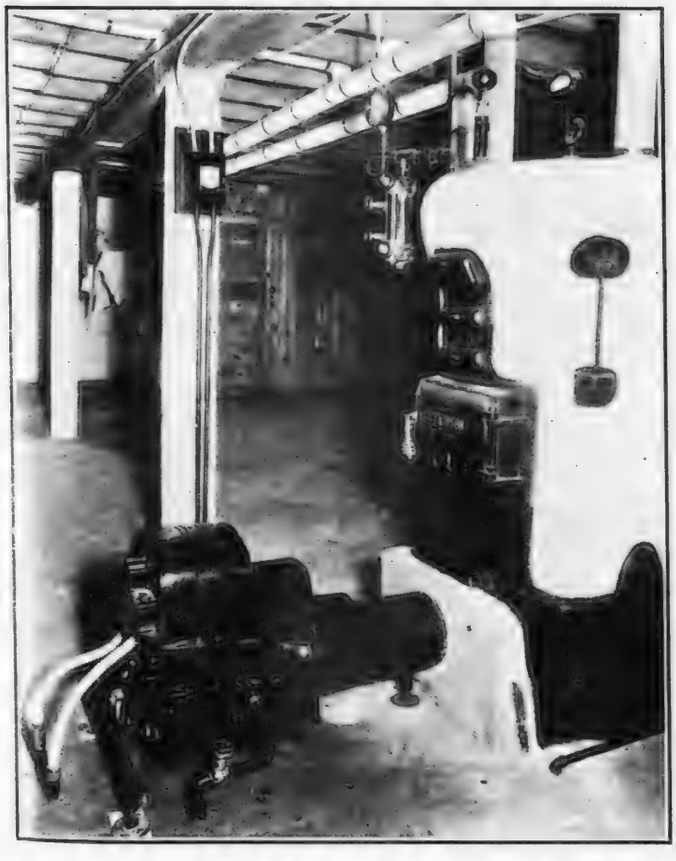
1. *Kleen Heet, July*, 1925.
2. *Baker, July*, 1925.
3. *Kerrihard, July*, 1925.
4. *Silent Glow, August*, 1925.
5. *Aetna, August*, 1925.
6. *Caloroil, September*, 1925.
7. *Oil-O-Matic, September*, 1925.
8. *Chalmers, October*, 1925.
9. *Hart, October*, 1925.
10. *Sun, October*, 1925.
11. *Rayfield, November*, 1925.
12. *A. B. C., November*, 1925.
13. *Electrol, December*, 1925.
14. *Grant, January*, 1926.
15. *Nu-Way, January*, 1926.
16. *Wayne, February*, 1926.
17. *May, February*, 1926.
18. *Ray Rotary, March*, 1926.
19. *Super Oil Heator, May*, 1926.
20. *Nokol, July*, 1926.
21. *Johnson, August*, 1926.

22.—Arrow.

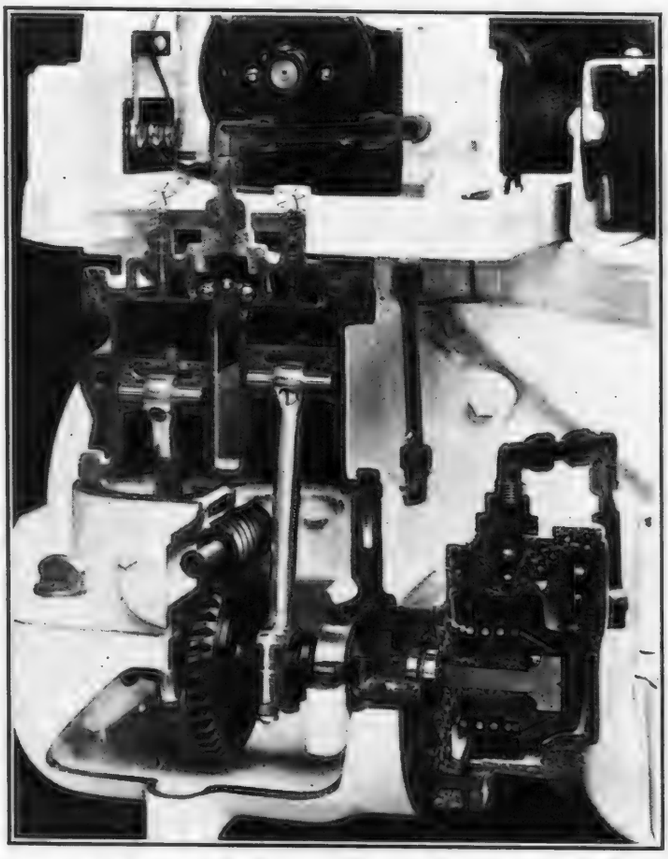
THE Arrow oil burner, specifically designed to burn oil of the furnace-oil grade in a steam truck, is the result of 10 years of oil-burner development work. This burner, purchased by the Socony Burner Corporation, after exhaustive tests to determine its suitability for domestic use, has been in field service in sections of New York and the New England States for four heating seasons. Factory branches now sell and service the Arrow burner in these states. Manufacturing and sales rights for the rest of the United States were acquired by the Timken-Detroit Company last year. This company is now manufacturing this burner in its Detroit plant and is distributing it through factory branches.

The Arrow oil burner is of the gun type, designed to utilize both the atomizing and vaporizing processes in preparing the fuel for combustion inside the furnace. Atomization of the oil is accomplished through the use of low-pressure atomizing air which, by its aspirating action in passing through an atomizer nozzle, draws up the oil and forces it out of the nozzle. It is broken up into a fine spray by the expansion of the atomizing air on leaving the nozzle. The oil spray then enters the ignition cone where a portion of this mixture is ignited by a spark from a spark terminal located at the top of the ignition cone. The heat from this flame vaporizes and ignites more and more fuel until a cone of flame is produced inside the generator tube. The generator tube confines the heat obtained from the burning particles to bake the atomized fuel, forming the core of the cone of flame. These particles are converted to a gas-like vapor in traveling through the generator tube and are mixed with the proper amount of air, supplied by the fan, for rapid combustion inside the furnace.

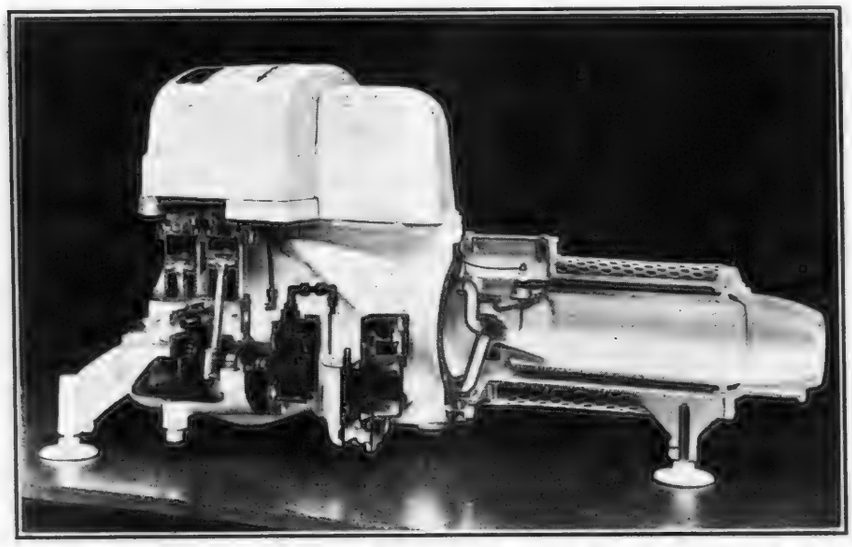
Air for ignition and combustion of all of the fuel is furnished by a fan through an air intake which is adjusted to allow the proper quantity of air to pass. The air discharged from the fan is directed to the generator tube where it is divided into several paths. The ignition cone is designed to deflect a small portion of fan air into the stream of atomized fuel particles and to direct another portion to the inside surface of the generator tube to form an air envelope around the cone of flame that is produced after ignition is accomplished.



Characteristic Installation of Arrow Oil Burner



Detail of Arrow Oil Burner, Showing Rugged Construction



Cut-Away Arrow Oil Burner—See Diagram Below for Designation of Parts

The remaining portion of fan air passes between the generator tube and generator tube housing to keep the castings at an even temperature and pre-heat the air which is directed into the flame at the generator tube nose.

FUEL SUPPLY

Fuel for operation of the burner is drawn from the supply tank by a differential fuel pump and discharged to the float-feed chamber. This pump is of special design to incorporate a variable discharge stroke controlled by float-feed chamber ports which limit the amount of fuel drawn from the supply tank to the amount required for operation of the burner. A magnetic oil valve starts and stops the flow of fuel to the needle valve and float chamber. The needle valve and float mechanism regulate the operating level and the float switch stops the burner whenever abnormal levels occur. A Weir tube located between the needle valve and float chambers regulates the height at which fuel will flow to the float chamber to limit the amount of fuel supplied to the burner after the magnetic oil valve is closed.

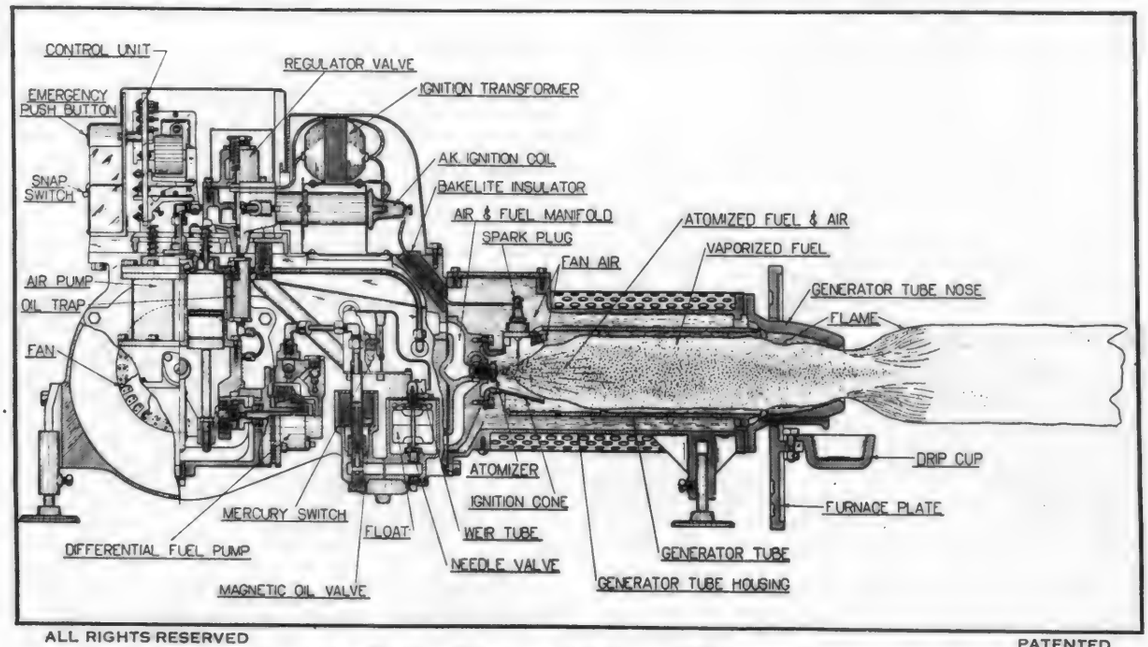
AUTOMATIC OPERATION

Control of the operating units of the burner to supply the required amount of heat regardless of temperature variations is secured through the operation of the temperature and safety control devices. These devices are suitably located and connected with a central control device consisting of a starting and a safety relay. When the starting relay is closed by the thermostat, it completes the operating circuits necessary for starting the burner. The safety relay controls the operation of the burner by preventing continued operation until it is closed. The starting relay cannot be closed unless the safety relay is open and will not remain closed unless the safety relay is closed before a predetermined amount of fuel has been used in the attempt to obtain normal operating conditions. A temperature control device located inside the generator tube operates the safety relay.

SAFETY CONTROL

Positive safety control is secured through the operation of float-feed chamber ports which limit the amount of fuel available for obtaining normal operation. A magnetic oil valve is closed by gravity each time the burner is shut down or after abnormal conditions have occurred. This valve remains closed until, and only as long as normal operation continues. The fuel supply with this valve closed is then limited to an amount which will allow the operation of the burner for a few seconds. Continued operation requires the action of a safety switch operated by temperatures inside the generator tube. Contacts of this switch are closed by an increase in temperature inside the generator tube to close the safety relay and open the magnetic oil valve. The switch contacts are opened whenever the temperature inside the generator tube is lowered. Separation of these contacts opens the safety relay and closes the magnetic oil valve and the burner is shut down in a safety position by a mercury switch which will not allow the operation of the burner below a predetermined oil level. Oil level conditions higher than normal are likewise protected by the mercury switch which opens the starting relay to stop the burner.

The burner is designed to provide for a maximum steam radiation of 1850 sq. ft. The Socony burner is listed by the Underwriters' Laboratories to burn Kerosene or distillate of 35°-45° A.P.I., and is approved by the New York City Board of Standards and Appeals.



ALL RIGHTS RESERVED PATENTED

A Sectional Diagram of Arrow Oil Burner

Buckeye Thermovent Units

Installation of Type E Thermovent, Showing Sheet-Metal Ducts for Air Distribution

Putting the Warm Air Where It Belongs

Instead of letting the heated air pile up at the ceiling and accumulate at a high temperature in order to heat the lower level of a room comfortably, the THERMOVENT blows its heated air downward with sufficient force to reach the floor, thereby heating the part of the room that is occupied, which is where the warm air belongs. This even distribution of the warm air obviates necessity of excessive heating to overcome the cold spots.

Being a ceiling mounted unit, its position is not only advantageous from a standpoint of efficient air diffusion, but is economical in the saving of valuable floor or wall space. Extremely compact and quiet in operation, and successfully disposes of many otherwise bothersome problems of heating and ventilating installations. THERMOVENT is particularly suited for heating and ventilating factories, garages and other industrial buildings as well as churches, theatres, auditoriums, gymnasiums and similar assembly rooms.

Send for our catalog fully describing the THERMOVENT UNIT and its advantages.

A Few of the Advantages

Low first Cost

Can be installed at from twenty to forty percent lower than direct radiation system because Thermovent eliminates the cost of valves, piping, traps, radiators, etc. Where ventilation is desired, it replaces system of direct radiation and large ventilating fans.

Ease of Installation

Easily installed, as it is shipped completely assembled ready for mounting. When in position only steam and electrical connections are necessary.

Small Space Required

Thermovent heights vary from 18" to 34" and depths from 38" to 55", and widths from 40" to 60", depending on requirements. Regularly designed for ceiling suspension, saving valuable floor space. Can be furnished for floor or other mountings.

Economical Operating Expense and Maintenance

Costs less to operate than direct radiation because all of the heat is utilized. Can be operated by manual or automatic control, giving intermittent or continuous service. Only two points in Thermovent require attention; namely, two motor bearings readily accessible for occasional oiling.

Effective Air Distribution and Diffusion

Has sufficient velocity to thoroughly diffuse the air and distribute it without objectionable drafts. Actual tests have shown maximum variation between floor and ceiling temperatures of average room less than ten percent.

Ease of Control

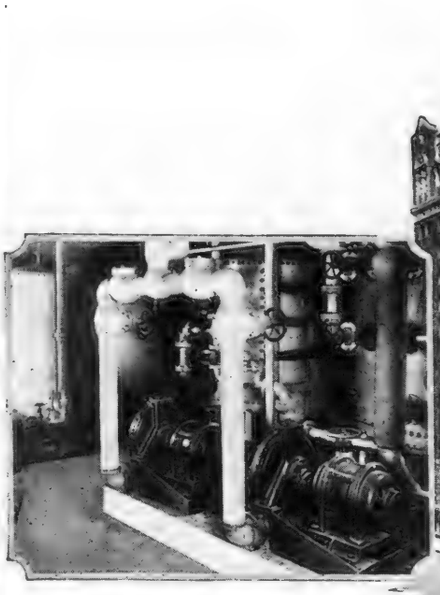
Motor can be started and stopped at will, manually or automatically. Some types provided with both by-pass and mixing dampers, manual or automatic control, permitting regulation and maintenance of room temperatures.

THE BUCKEYE BLOWER CO.

Columbus, Ohio

BRANCH OFFICES:

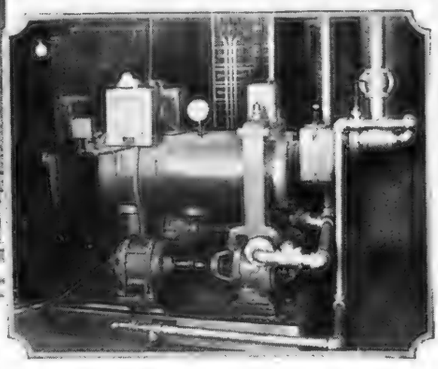
216 Bona Allen Bldg., Atlanta, Ga.
2126 Edmondson Ave., Baltimore, Md.
2017 Fourth Ave., North, Birmingham, Ala.
321 Jackson Building, Buffalo, N. Y.
301 Rose Building, Cleveland, Ohio.
401 Transportation Building, Chicago, Ill.
3115 No. Central Ave., Indianapolis, Ind.
1226 California St., Denver, Colo.
400 Penobscot Bldg., Detroit, Mich.
1400 Broadway, New York, N. Y.
1011 Pioneer Trust Co. Bldg., Kansas City, Mo.
321 Bulletin Building, Philadelphia, Pa.
709 Columbia Bank Bldg., Pittsburgh, Pa.
210 Dooly Bldg., Salt Lake City, Utah.
Fales Building, Seattle, Wash.
226 Kirk Ave., Syracuse, N. Y.
1101 Realty Building, Youngstown, Ohio.



Two motor driven Jennings Centrifugal House Service Pumps serving the Hotel President.

Hotel President, Baltimore Avenue and Fourteenth Street, Kansas City, Mo. Shepard & Wiser, architects, Kansas City, Mo.; Natkin Engineering Co., consulting heating engineers, Kansas City, Mo.; U. S. Engineering Co., heating contractors, Kansas City, Mo.; M. D. Woodling Heating & Ventilating Co.; plumbing contractors, Kansas City, Mo.

Motor driven Jennings Pump, duplex type arranged for automatic control, installed on the return line of the vacuum heating system of the Hotel President.



Jennings for the Hotel President

Select a building where only the finest equipment is installed, and you will invariably find a Jennings Pump on the return line for removing the condensation and air from the heating system. The Hotel President is typical of thousands of others.

Two things account for this universal preference for Jennings Pumps—dependability and economy.

A Jennings Heating Pump is just as reliable after many seasons of service as it is the day when installed. There is no metal-to-metal contact inside the the pump that can cause wear and a decrease in vacuum. Other than lubrication and packing, no attention is required. And the power consumption is, in some instances, as much as 50% lower than ordinarily required.

Our bulletins give complete information. Sent free on request.

NASH ENGINEERING COMPANY

SO. NORWALK CONNECTICUT

Branch Sales Offices: Atlanta, Birmingham, Boston, Buffalo, Chattanooga, Chicago, Cleveland, Dallas, Denver, Detroit, Indianapolis, Kansas City, Memphis, Miami, Minneapolis, New Orleans, New York, Omaha, Philadelphia, Pittsburgh, Portland, Richmond, St. Louis, Salt Lake City, San Francisco, Seattle, Tampa, Washington, D. C. **In Canada:** Montreal, Toronto and Vancouver. **European Offices:** London, Eng., Norman Eng. Co.; Brussels, Belgium, and Amsterdam, Holland, Louis Reijners & Co.; Oslo, Norway, and Stockholm, Sweden, Lorentzen & Wettre.

Jennings Pumps

RETURN LINE AND AIR LINE VACUUM PUMPS CONDENSATION AND CIRCULATING PUMPS

Trade and Miscellaneous Notes

Miscellaneous Notes

American Public Health Association has completed plans for holding its 55th annual meeting in Buffalo, N. Y., October 11-14.

National Trade Extension Bureau is looking forward to an enlargement of its organization as the result of the secretary's report, indicating that, with the heavy demand being made upon the bureau for service, an extension will be soon found necessary. The report carries with it a recommendation that plans be formulated for raising funds for greatly increasing the income of the bureau.

National Fire Protection Association is making elaborate plans for the observance of Fire Prevention Week, October 3-9, 1926. In addition to posters and "Fire Prevention Week" stickers, the association has published a 50-page illustrated handbook going into all phases of "Fire Prevention Week" observances, intended primarily for the guidance of committees and others planning "Fire Prevention Weeks."

Thomas F. Manville, former chairman of the board of Johns-Manville, Inc., who died recently, left an estate valued at $22,179,049, according to an appraisal recently filed in New York City. The principal beneficiaries are a son, Thomas F. Manville, Jr., and a daughter, Mrs. Lorraine Manville Gould. Mr. Manville owned a controlling interest in Johns-Manville, Inc.

E. L. Bowman, educational director of the National Trade Extension Bureau, has resigned to enter the burnt-clay products industry. His resignation took effect September 1. Mr. Bowman's new work will be along lines similar to those he has been following for the heating and plumbing industries. His headquarters will be in Columbus, Ohio.

Washington, D. C.—The rapid growth in American exports of manufactured goods and the immense importance of foreign sales of this class as a stabilizer in our total foreign trade, as well as in our domestic industry, is featured in a report by Dr. Julius Klein, director of the Bureau of Foreign and Domestic Commerce of the Department of Commerce. Exports of finished manufactures increased as compared with the preceding fiscal year by no less than 16%. They were 60% greater than in 1921-1922, only four years back. They were nearly three times as great in value as in the five-year period before the War. Even after allowing for higher prices they were more than double the pre-war average. This tremendous growth, states Dr. Klein, reflects the ever-rising efficiency of American industry and the energy and intelligence of American salesmanship in foreign markets.

Illinois Manufacturers' Association is taking an active part in opposing the proposed amendment to Article IX of the Illinois constitution, adopted by the 54th General Assembly and to be voted on at the election this fall. According to a statement issued by the Association the proposed amendment, if adopted by the people, will give the legislature, in addition to its present taxing powers, the authority to enact an unlimited income tax statute and will work to the disadvantage of manufacturers in many other ways. Corporations, such as those which compose mainly the membership of the Illinois Manufacturers' Association, it is added, might be taxed out of existence. The association is carrying on an active campaign to defeat the proposed amendment.

Committee on Standardization of the Heating and Piping Contractors National Association is at work on pipe sizes for heating systems. Many discrepancies have been found in existing

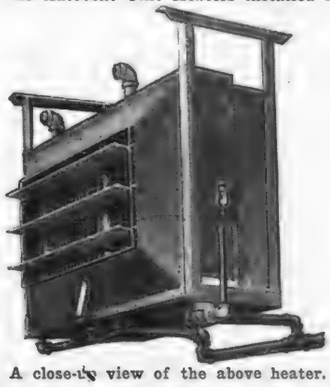
Why Are Autovent Unit Heaters So Popular?

The American Wood Carving Co., Chicago, showing two of the Autovent Unit Heaters installed in their factory.

The ceiling type heater, illustrated here, is only one of three designs available. We also build them for floor or side wall mounting.

AUTOVENT Unit Heaters are so popular because they are newly designed—they perform as promised—they are built in the Autovent Shops where high class workmanship has been the rule for years.

We claim no deep secret in the design of our Unit Heater. The principle is too simple for that. What we *do* know is that Autovent heaters are not flimsy in construction, nor are they a skimped job. The fact that each heater is equipped with a famous Autovent Propeller Fan is its best recommendation for quality. (Note that motor is not in the path of heated air.)



A close-up view of the above heater.

Economical - Modern - Heat Control

Instant positive control of heat is what sells Autovent Unit Heaters. Factories, Garages, Drill Halls, Textile Mills, Repair Shops are all prospects for this new type product.

Perhaps a plant near you wants a new heating system or has one particularly "hard-to-heat" area. If so, discuss Autovent Unit Heaters with the manager at once.

Estimates and prices cheerfully furnished by our Engineering Department.

AUTOVENT FAN & BLOWER CO.

730-738 W. Monroe St., CHICAGO

ENGINEERS IN ALL PRINCIPAL CITIES

tables and it will be the object of the committee to compile data that can be incorporated in the association's "Engineering Standards." The personnel of the committee remains the same as last year, with the exception that the place of President Harry M. Hart has been filled by the appointment of Charles D. Lamb, of Chicago. The committee is now made up of Walter L. Fleisher, New York, chairman; Ralph S. Franklin, Boston; Charles D. Lamb, Chicago; Robert C. Morgan, Philadelphia; S. Austin Pope, Chicago, and Richard A. Wolff, New York.

Boiler Output Committee of the Heating and Piping Contractors National Association is made up this year of George M. Getschow, Chicago, chairman; Walter L. Fleisher, New York; Harry M. Hart, Chicago (ex-officio); Charles D. Lamb, Chicago and Frank A. Merrill, Boston.

Manufacturers' Notes

Ross Heater & Mfg. Co., Inc., Buffalo, N. Y., announces the appointment of Harold M. Graham as chief engineer. Mr. Graham was formerly connected with the Condenser Department of the Westinghouse Electric & Manufacturing Company and later was associated with the Elliott Company. He has done much original work and investigation on the subject of heat transmission and vacuum. The company also announces the appointment of Ross H. Rathbun as sales manager. Mr. Rathbun is also a former Westinghouse man and was at one time in charge of the Central Station Department of the company with headquarters in Cleveland.

Scott Valve Mfg. Co., Detroit, Mich., has appointed H. L. Woolfendon as manager of its advertising department.

Winslow Boiler & Engineering Co., Kleen-Heet Division, announces the appointment of Fred Von Ritter as sales manager of the company's Chicago factory branch.

Air Conditioning & Engineering Co., St. Louis, Mo., announces the appointment of Harry L. Branigin as sales manager. The company manufactures Electrozone ventilating ozonators and Electrozone water sterilizers.

Autovent Fan & Blower Co., Chicago, has appointed the following representatives in their respective territories, Arthur E. Bacon, 922 Patterson Bldg., Denver, Colo.; Allied Industries, Inc., 53 Fourth St., Portland, Ore.; R. M. Booth, 609 Gwynne Bldg., Cincinnati, O.; E. H. Briggs & Co., Ltd., 265 Portage Ave., Winnipeg, Canada. These new representatives will enable the company to co-operate more closely with the electrical contractors, dealers and jobbers, as well as with heating, ventilating and sheet-metal contractors. The announcement lays stress on the fact that the company is endeavoring to develop business through the regular trade channel.

Honeywell Heating Specialties Co., Wabash, Ind., is the subject of an interesting item in the *American Messenger*, a house organ, issued by the American Express Company, telling the story of how widely by express alone the company's products are distributed. The article appears under the heading, "Wabash Makes a Notable Record:"

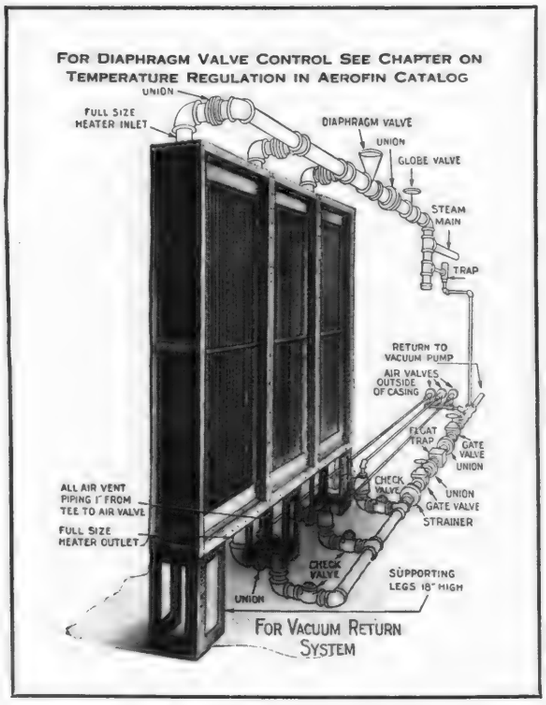
"Wabash, Ind., we note, has made a notable record in the handling of the business of the Honeywell Heating Specialties Co., of that city, although of course every employe through whose hands the business passed and destination agents deserve a part of the credit.

"According to Agent W. J. Fisher, the heating company last year, forwarded 4,500 shipments from Wabash amounting to 36,000 pieces, and was not required to file a claim against any of them. On its inbound business, the same company received 4,000 shipments, consisting of 20,000 pieces, and only two claims were filed on the traffic."

Oil Heating Co., Chicago, local distributors for the American Nokol Company, announces the appointment of J. C. Botel, formerly of the Absolute Con-tac-tor Corporation, Beloit, Wis., as a member of that organization.

Kewanee Boiler Company, Kewanee, Ill., announces the election of A. V. Martin as a member of the company's board of directors. Mr. Martin is manager of the Chicago branch.

International Heater Co., Utica, N. Y.,



AEROFIN CORPORATION
750 Frelinghuysen Avenue
Newark, N.J.
L. C. Soule, *Sec'y and Sales Manager*

AEROFIN
Fan-System Heating Surface

To Engineers, Architects and Contractors

The Vertical Tube Arrangement of Aerofin is preferred because it guarantees perfect drainage of condensation and is less subject to errors of installation and operation. The Horizontal Tube Arrangement may be used when installed in accordance with our instructions and diagrams.

The Labor Cost of Installing Aerofin is practically nothing. Two men (without tackle) can handle the units and fit them together like building blocks. Why pay 20 cents per foot of heating surface for labor of erecting TONS of cumbersome heaters? Use Aerofin and cut down your installed cost for Heaters.

Aerofin weighs only 1/10 to 1/4 as much as the old fashioned heavy heaters.

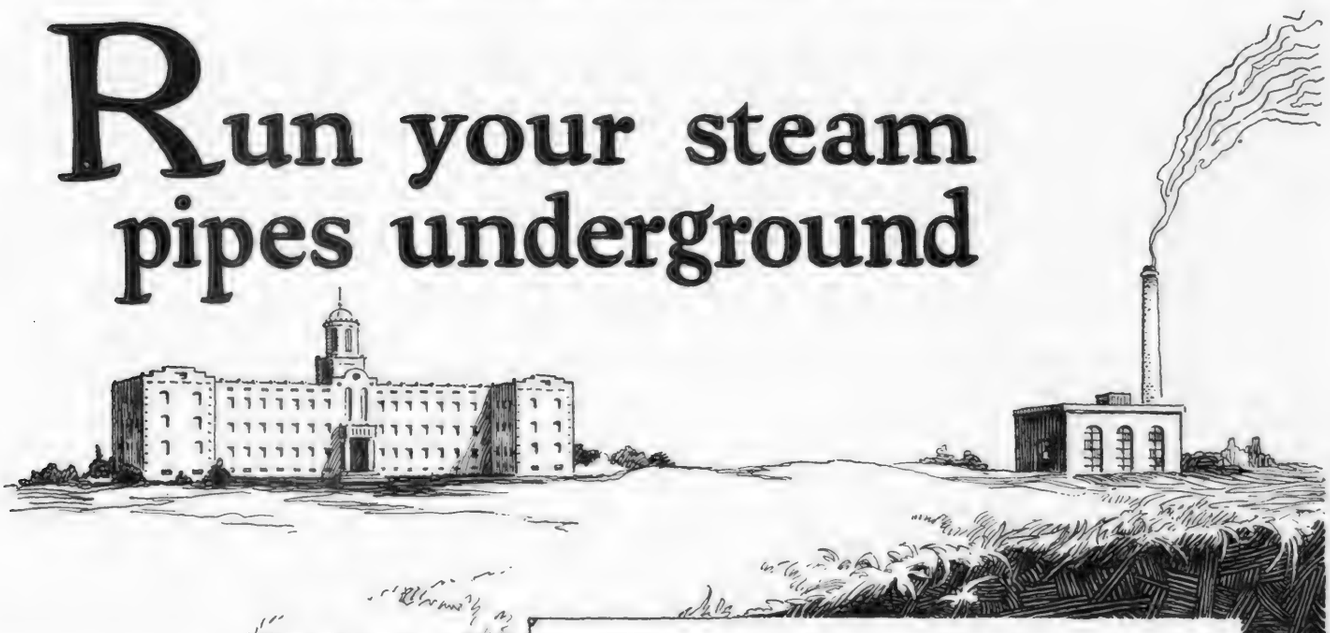
Aerofin saves a great deal of space.

Aerofin is made of non-corrosive metals.

Since there is no equal to Aerofin why not specify it outright? Plans and specifications should show sizes, number and arrangement of units with piping details.

Write for catalog, instruction leaflet and service details.
Aerofin is Sold ONLY by Manufacturers of Nationally Advertised Blower Heating Apparatus.

Run your steam pipes underground



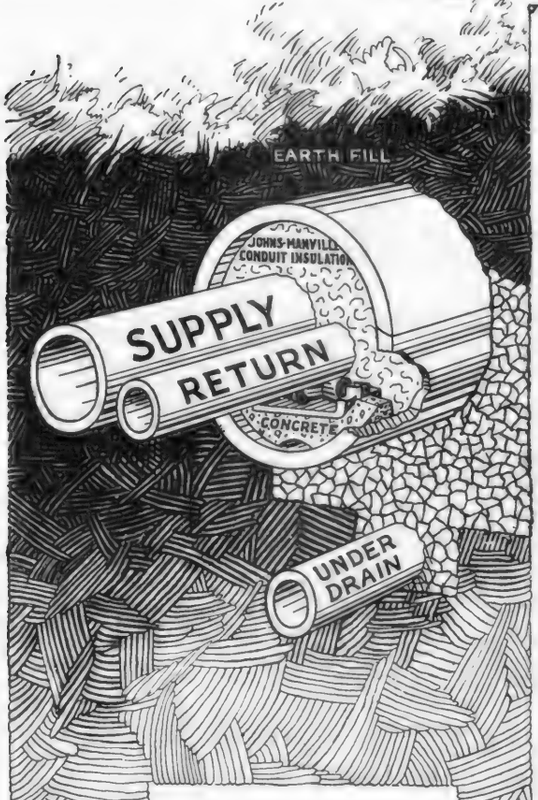
by this economical method

THE Johns-Manville Underground System of Insulation couples an efficient distributing system to the economy of the central power house. The result is maximum economy for the whole.

This method does away with the unsightly appearance of overhead lines and the heavy expense of a walking tunnel.

It has a guaranteed efficiency of 90%. The fundamental design is based on the insulating experience of a company that has been successful for over fifty years. The planning of each specific installation is in the hands of men who have planned many of the largest installations in the country. All construction is supervised by an experienced Johns-Manville engineer.

In this way, careful design, planning and construction are combined to give you a completely satisfactory system.



The above illustration shows component parts of the Johns-Manville System.

JOHNS-MANVILLE Inc., 292 Madison Ave., at 41st St., New York
Branches in all large cities
For Canada: Canadian Johns-Manville Co., Ltd., Toronto

JOHNS-MANVILLE

Underground System of Insulation

Through Asbestos and its allied products
INSULATION
BRAKE LININGS
ROOFINGS
PACKINGS
CEMENTS
FIRE PREVENTION PRODUCTS

has opened a new and larger warehouse in New York at 541 West 69th Street. A complete line will be carried at that point, including boilers, radiators, furnaces and repairs. The Company's New York Office is in the Fisk Building, Broadway and 68th Street.

Little Giant Mfg. Co., Minneapolis, Minn., manufacturer of radiator hangers, radiator cups and other heating accessories and specialties announces the appointment of William O'Neill as its southern representative, covering the States of North Carolina, South Carolina, Georgia, Tennessee, and Florida, with offices in Jacksonville, Atlanta, Charlotte and Birmingham. Mr. O'Neill's headquarters will be at 211 Dyal-Upchurch Building, Jacksonville, Fla.

Gorton & Lidgerwood Co., New York, has appointed the Adolf Frese Corporation, 726 South Hope Street, Los Angeles, Cal., as its sales agent for the southern California territory. Frank E. Witte, 1061 Howard Street, will continue to handle the northern California territory for the Company.

York Heating & Ventilating Corp., Philadelphia, Pa., has appointed J. V. Cavileer as a member of its executive branch with headquarters in the main office of the company at 1502 Locust Street, Philadelphia. For the past ten years Mr. Cavileer has been sales engineer and office manager of the Philadelphia office of the Buffalo Forge Company, thus acquiring a wide experience in dealing with problems of ventilation, heating and mechanical movement of air. He is treasurer of the Philadelphia Chapter of the American Society of Heating and Ventilating Engineers.

W. D. Cashin Co., 35 Hartford Street, Boston, Mass., has appointed J. H. Doody of 625 North Spaulding Avenue, Los Angeles, Cal., as distributor for Thermoflex products on the Pacific coast. Mr. Doody was formerly associated with the Fairbanks-Morse Company in St. John, N. D., where he gained a wide experience in the ventilating field. The W. D. Cashin Company announces that it is now in production and deliveries are being made of the Thermoflex duplex automatic boiler feeder in which one float controls both inlet of water and overflow of water. The principles of the non-overflow or No. 1 feeder, the company states, has been incorporated in the No. 2 feeder, with the addition of the overflow principle.

Jenkins Bros., New York, has concluded the sixty-second year of its business career with a convention of salesmen and representatives from points not only in the United States, but from Canada, England, Cuba and Mexico. During the convention trips were made to the company's plant in Bridgeport, Conn., where the party inspected the bronze and iron valve factories, and to the Jenkins Brothers Rubber Division, Elizabeth, N. J., devoted to the manufacture of Jenkins sheet packings, discs, pump valves and other rubber mechanical goods.

Crane Co., Chicago, has declared a stock dividend of 10% on the common stock payable October 15 to stock of record September 15. The company has also declared the regular quarterly dividends of 37½% on the $25 par value common stock and 1¾% on the preferred stock.

Warren Webster & Co., Camden, N. J., announces the opening of branch offices in Des Moines, Ia., and in Baltimore, Md. The Des Moines branch will be in charge of Harry E. Drain, as district representative, and will serve the requirements of Webster customers in Iowa, operating under the Webster Chicago branch office. The Baltimore branch will be conducted by Max Paul Miller, who has been associated with the company's home office as sales engineer from 1900 to 1914, qualifying him to an exceptional degree to co-operate with consulting engineers, architects, contractors and others.

Aetna Modern Utilities Co., Providence, R. I., is the new name of the Aetna Oil Burner Company, of that city. The company has appointed R. E. Murphy, formerly president of the Hardinge Fuel Oil Heating Co., of Chicago, as its representative in Illinois, who has been representing the Aetna company, has been made vice-president and district sales manager.

Spraco Filter Cell

The SPRACO Rotary Washing Tank, recommended for large installations, is the most effective device for washing cells with a minimum of labor.

SPRACO AIR FILTERS

Fulfill all the requirements for an ideal air cleaning device.

Cleaning efficiency is unusually high, due to the correct filter media principle.

Initial cost is low.

Installation expense is reduced to a minimum by use of the sash-like, all welded sectional framework.

Resistance is maintained constant by routine cleaning.

There are no moving parts to wear out and no power required to operate.

SPRACO Washing Tanks are equipped with a steam water heater, large drain cock and combination cover and drain rack.

Send for Bulletin F-81

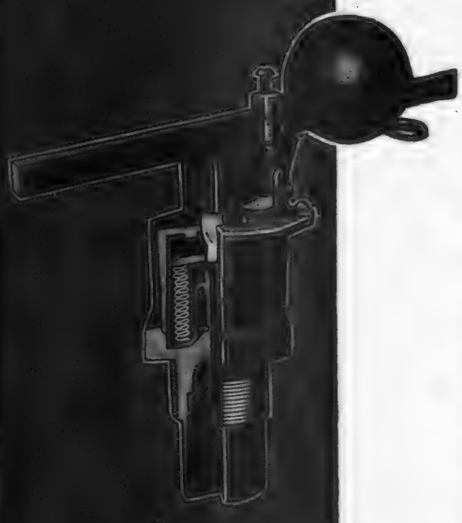
Air Washers
Cooling Ponds
Spray Nozzles

Spray Engineering Company
60 High Street
BOSTON, MASSACHUSETTS

Air Filters
Strainers
Flow Meters

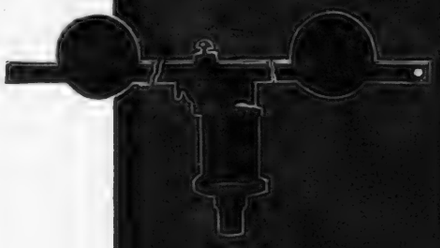
Sylphon
TRADE MARK

Hot Water Damper Regulators



This can be done hundreds of thousands of times—
AND NO APPRECIABLE LOSS OF FLEXIBILITY WILL DEVELOP IN THE ALL METAL SEAMLESS SYLPHON BELLOWS
Sylphon

The seamless, solderless, all-metal sylphon bellows. Used as the thermostat in all Sylphon Regulators.



What Regulator Do You Install to Control House Heating Water Boilers?

THERE was a time when only the steam boiler was equipped with an automatic damper regulator, but today almost everybody knows that an uncontrolled hot water heating system causes fully as much waste of fuel, and just as much discomfort, as an uncontrolled system.

Sylphon Hot Water Damper Regulators are being installed on most hot water boilers, for the same reasons that they are supplied as standard equipment on nearly all leading makes of steam boilers. A Sylphon Regulator will automatically open and close the draft dampers in quick and direct response to changes in water temperature, help keep the house uniformly heated, and save materially in fuel consumption.

Use Sylphon Hot Water Damper Regulators on the hot water heating boilers you install. They guarantee life-long control without servicing costs, because they contain the well-known Sylphon Bellows as diaphragm.

Ask for Bulletin WDR-5
Also our new catalog W-200 just issued

THE FULTON COMPANY KNOXVILLE, TENN.

Sales offices in: NEW YORK, CHICAGO, DETROIT, BOSTON, PHILADELPHIA, *and all the principal cities in U. S.*
European representatives: Crosby Valve & Engineering Co., Ltd., 41-42 Foley St., London, W. 1, England,
Canadian representatives: Darling Bros., Ltd., 120 Prince St., Montreal, Canada.

Central Station Heating Notes

Eugene, Ore.—Immediate extension of the mains of the plant of the Central Heating Company, Eugene, Ore., to at least three business buildings east of Williamatte Street is proposed by the company through the application to the city council for a franchise to cover additional territory.

Sidney, Neb.—Some idea of the provisions which are now being sought by district heating companies in new franchises may be had from the proposed ordinance in Sidney, for the granting of a district heating franchise, in favor of the Western Public Service Company. The proposed franchise is supposed to run for a period of twenty-five years. The service is to be continuous 24 hours a day. Steam heating rates are fixed at:

First, 10,000 lbs.	$1.00 per 1000 lbs.
Next 10,000 lbs.	.90 per 1000 lbs.
Next 10,000 lbs.	.80 per 1000 lbs.
Next 10,000 lbs.	.70 per 1000 lbs.
Next 10,000 lbs.	.60 per 1000 lbs.
Over 50,000 lbs.	.50 per 1000 lbs.

Minimum charge—$2.00 per month per service connection.

Prompt payment discount of 10% for payment on or before the tenth of the month.

One of the conditions of the proposed ordinance is that the present Sidney municipal light and power plant and system, steam heating system, and municipal water system be sold to the Western Public Service Company.

New Incorporations

Landon Radiator Co., North Tonawanda, N. Y., capital $50,000, to manufacture steam and water radiators. Among the principles of the company are A. A. Landon formerly vice-president in charge of manufacture of the American Radiator Co., Buffalo, N. Y. With him are associated Seymour H. Knox, George F. Rand and others. The company has taken over the Pierce-Brown foundry in North Tonawanda and it is expected that a production basis will be reached by December 1.

National Rotary Oil Burner Co., Inc., New York, capital $350,000.00 to be distributed nationally, the National rotary oil burner, a motor-driven burner for homes. Incorporators: T. B. Allardice, E. R. Leonard, T. R. Leonard and C. A. Springstead, all of Mountain Lakes, N. J. The company's manufacturing facilities are located at 243 44th St., Brooklyn, N. Y. The main office is at 50 Church Street, in the Hudson Terminal Building, New York. Mr. Allardice, president of the company is an experienced engineer, while T. R. Leonard, who is treasurer, was formerly connected with the Leonard Sheet Metal Works, of Hoboken. E. R. Leonard is vice-president. H. K. Tucker, formerly identified with the National Rotary Burner Co., of York, Pa., is sales manager. The company has distributing points throughout the eastern States.

Contracts Awarded

Dixie Heating, Ventilating Co., Houston, Texas; air cooling and refrigeration for $2,000,000 theater being erected for the Saenger Amusement Company on Canal St., New Orleans.

A. J. Weyant, Lincoln, Neb., heating and plumbing, Lincoln high school addition for $39,511. Other bids were: Newberg and Bookstrom, $40,332; Phelps Underwood $43,367; Hart Plumbing Co., $41,933; B. Grunwald of Omaha $40,827. The contract for temperature control for the building went to the National Regulator Company at its bid of $3,171.

Cornell Supply Co., Lincoln, Neb., exhaust ventilating fan for the window-ventilating system at the Bryant, Hayward & Willard schools. The contract price was $995.61.

Miner D. Wooding Heating & Ventilating Co., Kansas City, Mo., heating and ventilating athletic field building, to be used jointly by Central and Junior high school, for $52,508.

Specify

Powell Valves

For Long Uninterrupted Service

Fig. 163

POWELL COMPOSITE DISC VALVES

are furnished with bronze body and trimmings or in Iron Body with Bronze trimmings.

Bronze valves with union outlets are obtainable for both hot water and steam heating installations.

Discs are interchangeable with all standard vulcanized discs. However, we recommend Powell.

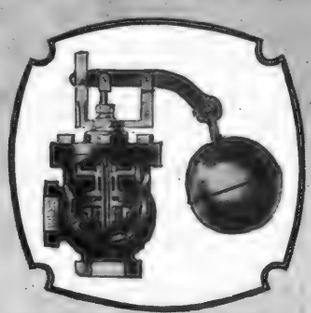
Descriptive circular on request.

THE WILLIAM POWELL COMPANY

Dependable Engineering Appliances

2521-2531 Spring Grove Ave., Cincinnati, Ohio

VALVE MAKERS FOR OVER FIFTY YEARS



THE Davis Float Valve is an example of the perfected design proven by years of performance that is typical of the Davis Valve Specialties.

This valve closes tight; the inner valve is loosely fitted and will not stick. It has no leather cup packing. The inner valve has a hollow post, and is operated by pressure. The stem, which is directly connected to the float, forms an auxiliary valve.

The single seat has a renewable composition disc, and is always tight when closed. There is no leakage from the top of the valve to run down over the body.

Engineers who want a reliable valve for controlling inlet to tanks and reservoirs by means of the water level get the utmost in service and economy with the Davis Float Valve.

DAVIS VALVE SPECIALTIES

STEAM-SAVERS SINCE 1875

G. M. DAVIS REGULATOR CO., 422 Milwaukee Avenue, Chicago, Ill.

A New Short Cut in Installing Column Radiators

YOU'RE well acquainted with the causes of trouble and delay in installing the legless type of radiator. Note how they are reduced by several special features in the new Grinnell Column Radiator Bracket.

It has only three points of contact; thus reducing the extent to which rough walls can slow up installation.

Only one bolt is required to secure it firm and fast.

An unusually wide range of adjustment is provided—both vertically and horizontally. Need for extremely accurate, time-wasting measurements is eliminated.

All these points are clearly illustrated in the descriptive pamphlet on this rugged time-saving bracket. Send for a copy or copies. Address Grinnell Company, Inc., 275 West Exchange Street, Providence, R. I.

GRINNELL

Fittings, Hangers, Valves, Pipe Bending Welding, Piping Supplies, Etc.

Caloroil Sales Conference

The Caloroil Burner Corporation, of New York, held its first annual sales conference of dealers and sales representatives in New York, July 14-16. The conference was attended by representatives from practically all parts of the United States. The latest type of Caloroil burner with electric-gas ignition and the new burner head was on display and occasioned much favorable comment.

Talks were made by George Bullock, president of the company, on the general policy of the organization; by G. H. Rittenhouse, director of sales, on the sales policy and advertising, so that each dealer might secure the greatest benefit from the Caloroil national advertising program, and by M. J. Binkley, vice-president, on the production, development and experimental work in the Caloroil laboratory.

House refrigeration was discussed by E. M. Ryan, sales manager of the American Electric Corporation. C. F. Olmstead of the American Oil Burner Association, gave an interesting talk on the oil situation, showing the direct relation of the oil-fuel to the oil-burner business. Time payments were discussed by T. H. Harfman, vice-president of the Credit Alliance Corporation.

On the last day of the conference, the entire dealer organization visited the Caloroil factory at Jersey City. Each operation was shown and explained in detail from the time the raw material enters the factory until it is crated and packed for shipment.

On the first night of the conference, the representatives attended a banquet at the Hotel Belmont and on the last night, they attended the Berlenbach-Delaney fight, as guests of the Caloroil Burner Corporation.

Smaller Profits Being Made in Manufacturing

DESPITE the abounding prosperity on the part of many individual business concerns, indications are that less of the consumer's dollar is going into manufacturing profit now than has been the case at any time since the war, with the exception of the critical year 1921, according to a study of manufacturing corporation incomes made by the National Industrial Conference Board of New York.

While in 1919, 9.28 cents out of every dollar of the manufacturer's gross receipts represents net income, his net income amounted to only 6.35 cents per dollar of gross receipts in 1923, the latest year for which comprehensive income statistics are available. Out of that, moreover, he had to pay income and profit taxes. Although increased manufacturing efficiency may have increased the net income somewhat since that time, higher wages and a practically stable price level combined have not left much leeway to the manufacturer to increase his margin of profit during the last two years, according to the board.

GREATER VOLUME AT SMALLER PROFIT

While the number of manufacturing corporations reporting a net income was practically the same in 1919 as in 1923, showing an increase of only 3.6%, their total gross income increased from $45,704,873,968 to $48,686,639,790, or 6.5%. Prices, however, had declined considerably during the four years, so that the increase in volume of business done in 1923 over that of 1919 was considerably greater than indicated by the gross income figures. The gross income for both years, reduced in both instances to terms of dollars of 1913 purchasing power so as to take into account the price decline, shows an increase of 43% from 1919 to 1923. While this figure does not necessarily measure the exact increase in volume of business in all branches of manufacturing, it is significant when compared with the net income figures for the same years, which, likewise reduced to terms of 1913 dollars, show an increase of only 9.9% from 1919 to 1923, definitely indicating the declining rate of profit at which these corporations were operating.

The above analysis, according to the Conference Board, reveals that in 1923

GORTON BOILERS

SOME SERVICE RECORDS!

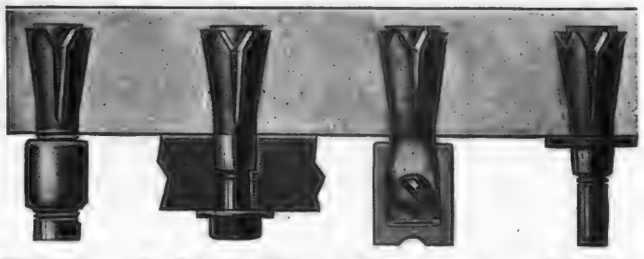
40 Years — No. 6 Gorton Steam Boiler installed Newark News Building 1886;—*40 years*—continuous service. Still going strong.

37 Years — No. 4 installed at Rochester, N. Y., in 1889—*37 years*—now being replaced by a new Gorton Boiler.

36 Years — H. F. A. Schmidt, Worcester, Mass., writes: "Am the proud possessor of a Gorton Heater installed in 1890; —*36 years*. Has been in constant use and repair bills have been very small."

The boiler that Lasts!

Gorton & Lidgerwood Co.
96 Liberty Street, New York, N. Y.
Established 1887 Representatives in Principal Cities



Phillips Self-drilling Expansion Shells

For fastening all types of hangers to concrete ceilings, side-beams, columns and walls, and for bolting timbers and other equipment to concrete and stone.

Installing Self-drilling Shells in Concrete

Every shell is a drill and makes its own hole, thus eliminating drill trouble and expense.

A new sharp drill for every hole and a smaller hole per given size bolt reduces labor cost of installing to absolute minimum.

A perfect fitting hole and the enlargement of shell and hole at extreme bottom insures reliability and better workmanship.

Quickly installed with the Phillips Spring Hammer, or with special hand chucks.

Ceiling with Phillips Spring Hammer Drill

Manufactured by
PHILLIPS DRILL COMPANY
1537 Cortland Street CHICAGO, ILL.

The VENTURAFIN METHOD OF HEATING

—proves its efficiency in this Plant

Writes *J. Hall Taylor, President of the American Spiral Pipe Works, Chicago, Illinois*

"In planning to heat this building we figured on the ordinary steam radiation that we had always used; but when we took up the American Blower Venturafin Unit Heater Method with our heating engineer, he suggested that we install 4 No. 4 Venturafin units.

"He did not, however, believe that these 4 heaters would be quite sufficient, and recommended placing 5 additional heating coils along the west wall to give 890 ft. of additional radiation. But the Venturafins not only heated the addition to the machine shop, but also the machine shop itself, giving us an even, comfortable working condition in the most severe weather, and making it unnecessary to install the additional heating coils. And only during the coldest weather is it necessary to run the Venturafins through the night.

"The Venturafin Heaters have the big advantage of distributing an even heat throughout the building. Steam coils, on the other hand, do not radiate to any great distance from the coils, because the heat from the coils quickly rises to the ceiling.

"The Venturafins also occupy less space than steam coils, and can be placed anywhere, thereby saving needed space. Maintenance with them is negligible."

✓ HEAT WITH UNIT HEATERS

AMERICAN BLOWER CO., DETROIT, MICH.
BRANCH OFFICES IN ALL PRINCIPAL CITIES
Canadian Sirocco Company, Limited, Windsor, Ontario

(550-A)

American Blower

"Sirocco" VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT

MANUFACTURERS OF ALL TYPES OF AIR HANDLING EQUIPMENT SINCE 1881

manufacturing was done in greater volume, but at a considerably smaller margin of profit, and that the amount of manufacturing business done at a loss, or the volume of goods which were sold at prices which did not reimburse the manufacturers for their production, was half again as great in 1923 as in 1919, although both these years have generally been considered as good business years. This, in the view of the board, was due partly to the fact that in 1919 business was being done at a rapidly-rising level of prices, while in 1923 a fairly steady price-level prevailed.

While the latest available statistics for the above analysis are for the year 1923, much the same conditions prevailed in 1925 and the first half of 1926 as to the movement of prices, the board declares, making the significance of the 1923 figures applicable to present-day conditions.

WANTED

ENGINEER WANTED.—An experienced hot blast service engineer who actually knows air and heat. Must be high-class. Address McCann-Harrison Corp., Cleveland, O.

POSITION WANTED.—Heating and ventilating engineer wishes position in capacity of designer and supervisor of heating and ventilating systems. Address Box 91, care of Heating and Ventilating Magazine.

POSITION WANTED.—Temporary position in New York as draftsman from October 1 until Christmas. Familiar with all ordinary methods of heating and ventilating buildings. Salary, $35 a week, or, alternately, expenses paid. Address, Box 94, care of Heating and Ventilating Magazine.

FOR SALE.—Pipe-threading and cutting machine, 1-in. to 8-in. pipe. Complete with dies. In perfect condition. $350.00. Wonderful value. Address Box 92, care of Heating and Ventilating Magazine.

SALES REPRESENTATIVES WANTED.—With heating and ventilating experience; acquainted with industrial field. Openings in metropolitan and out-of-town territories. An opportunity to become associated with a young and growing organization. Give experience and references. Address Box 93, care of Heating and Ventilating Magazine.

SALES ENGINEERS WANTED.—We require for our New York and Philadelphia branches, technically-trained men who have made their mark at selling vapor, vacuum or low-pressure heating systems. Men of personality who have earned the entree to architects' and engineers' offices, men willing to work and able to see a really big future for themselves, men who can sell a nationally-known heating system of proven and acknowledged worth. If you can qualify, please address Box 84, care of Heating and Ventilating Magazine.

MANUFACTURER'S REPRESENTATIVE—Manufacturer of complete line of fans, air washers and unit heaters desires recognized representatives on commission basis. Address Box 53, care of Heating and Ventilating Magazine.

"Readers Announcement"

Our Educational Service is being extended to readers of THE HEATING AND VENTILATING MAGAZINE. It is for Manufacturing and Contracting folks, as Employers, Draftsmen, Salesmen, Mechanics, Clerks, Apprentices, etc.

Since 1910 the St. Louis Technical Institute has taught quite an army of folks desiring to improve their opportunities. Our courses are Modern, Comprehensive and Official, and designed to give you those higher, finer touches your profession requires.

We Teach You In Your Own Home, Personal, Clear, Direct.

Our School Directory sent Free to interested parties. Indicate your Course when writing.

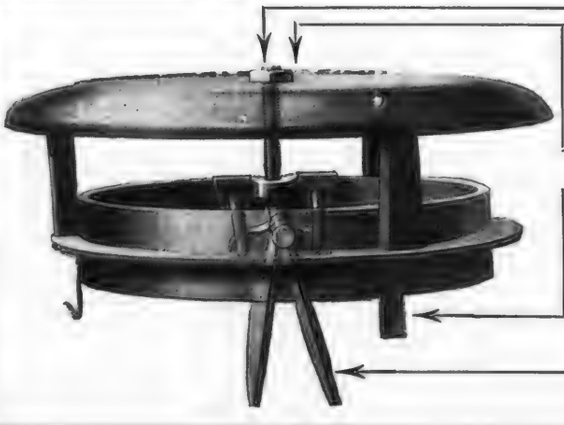
HEATING VENTILATING ENGINEERING
SPECIAL STEAM AND WATER HEATING
PLUMBING DESIGN AND INSTALLATION
WARM AIR HEATING
CONTRACTING AND ESTIMATING
MECHANICAL DRAFTING

Start with the 1925-26 School Season

ST. LOUIS TECHNICAL INSTITUTE
4541 Clayton Ave., St. Louis, Missouri

MANUFACTURED WEATHER
makes
"Every day a *good* day"
Humidification · Dehumidification
Heating · Ventilation · Purification
Drying
Carrier
Engineering Corporation
750 Frelinghuysen Ave. Newark, N. J.
Boston Cleveland Chicago New York Philadelphia Los Angeles Kansas City

SEE OUR DETAILED DATA IN A.S.H.&V.E. GUIDE



E-Z DAMPER GRIP-TITE

Bolt for operating damper with screw driver.

Lock nut.

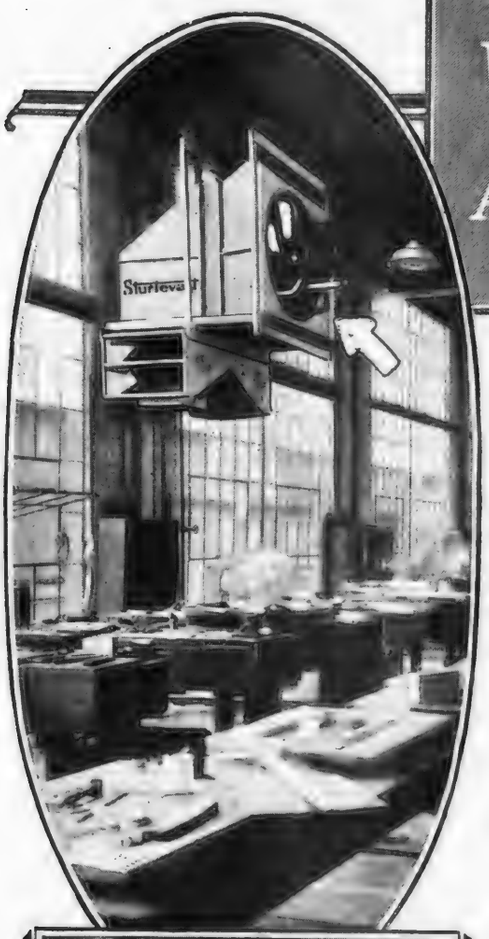
Griptites. 3 on round, 4 on squared oval mushrooms. Made of substantial spring steel. Will positively hold mushroom in place.

Damper partly open. Closes tight—opens wide. Every intermediate adjustment possible.

ÆOLUS DICKINSON CO.
3336-44 So. Artesian Ave., Chicago

"HEAT with Unit Heaters"

HEAT
In a hurry
Where you need it
At low cost!



In Oval: General Electric Company, Schenectady, N. Y.

In Square: Mack Motor Truck Company, Brighton, Mass.

THERE are no substitutes for experience and skill.

The Sturtevant Design No. 3 Unit Heater is the result of over 60 years of experience. It is the product of an organization whose research, engineering and manufacturing facilities in the domain of air engineering are unexcelled anywhere in the world.

A NEW CATALOG:—Catalog No. 339 describes the Sturtevant Design No. 3 Unit Heater in detail and contains much helpful data of interest to architects, engineers and contractors. We would welcome your request for a copy.

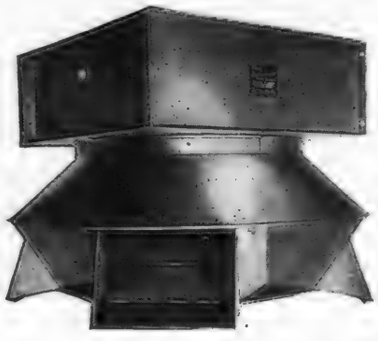
B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS.

Atlanta	Charlotte	Dallas	Indianapolis	Montreal	Rochester
Boston	Chicago	Denver	Kansas City	New York	St. Louis
Buffalo	Cincinnati	Detroit	Los Angeles	Pittsburgh	Salt Lake City
Camden	Cleveland	Hartford	Minneapolis	Portland	San Francisco
Seattle		Toronto		Washington	

Sturtevant (REG. U. S. PAT. OFF.) Unit Heaters

with the Sturtevant Super-efficiency fan

Wing Featherweight Unit Heaters for Low Buildings



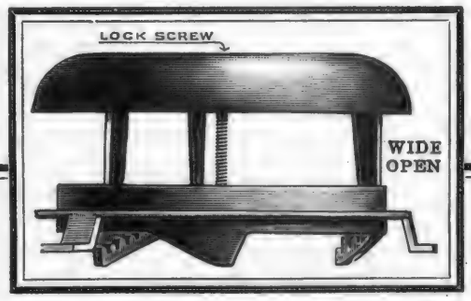
In low buildings uniform distribution of the heat supplied is all important. Heat delivered to such a building from a single point and in but one direction will create uncomfortable vitality sapping hot spots.

The low ceiling type of Wing Featherweight Unit Heaters is provided with 4 air outlets, each discharging in a different direction downward toward the floor. This assures uniform heat distribution to all corners of the building, and the overhead installation adopted on all Wing installations not only saves valuable floor space but makes possible the heating of the working level first and greatly simplifies steam and return piping.

L. J. Wing Mfg. Co.

Fans and Exhausters *Forced Draft Blowers*
Small Turbines *Unit Heaters*

Hudson & 13th Sts. New York City



Nu-Notch
REG. U.S. PAT. OFF.

Mushroom

Something new in the ventilating industry is our improved ventilator for theatres, auditoriums and like types of buildings—the NU-NOTCH!

The NU-NOTCH has taken a leading place because of its mechanical perfection, and unobstructed throat—permitting the free passage of air. It is easily adjusted to many regulations, and when adjustment is made, no idle foot may kick it out of place—the lock screw fastening it firmly in place in recessed notches.

Our Engineering Department invites questions and investigation of all features of the NU-NOTCH. Let us send full details.

Knowles Mushroom Ventilator Co.
202-204 Franklin St. NEW YORK CITY

NOISE is a great detriment to work. It hinders and annoys.

Elimination of vibration and the noise made by the whir of fans and motors is possible by the use of "ABSORBO" beneath the base of the apparatus—as shown in the illustration above.

"ABSORBO" is made of specially selected strips of natural cork, impregnated with creosote, making it impervious to oil and water.

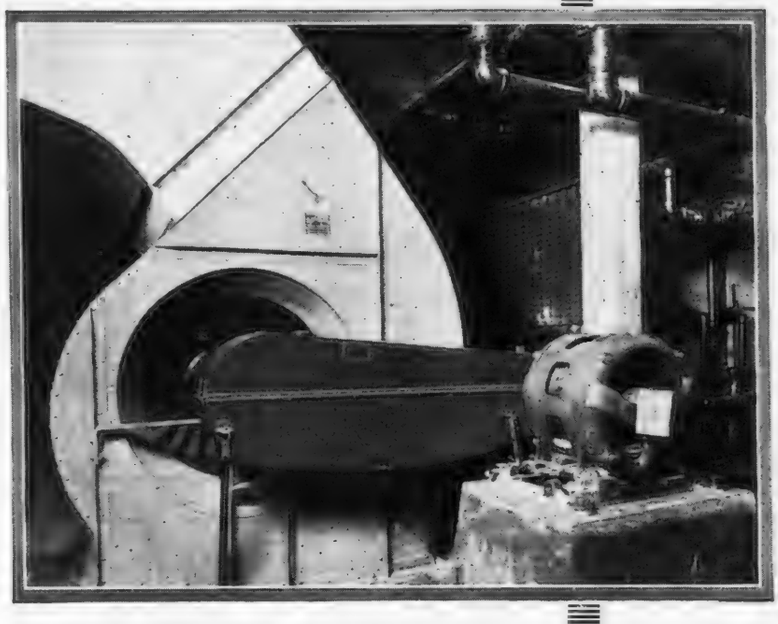
Inquiries will receive our attention and questions our frank replies.

Cork Foundation Company
315 Fifth Avenue, New York

Better Industrial Heating and Ventilating "Buffalo"

When a Buffalo heating and ventilating system is selected for an industrial plant, the management is obtaining trouble-proof, economical heating, with modern equipment.

Here's what one industrial user (and there are thousands of 'em) thinks about Buffalo Heating and Ventilating:



T. H. Libbey, Foundry Superintendent, The Studebaker Corporation, South Bend, Ind., says:

"Our new foundry is one of the largest in the country, covering fourteen acres. Six bays extend 400 feet of its length, with high and low roof sashes arranged to aid the natural circulation of air. Both natural and artificial heating and ventilating are combined to give best possible working conditions.

"Seven Buffalo Forge fans, chain-driven from 50 H.P. motors operating at 1,160 R.P.M., furnish complete artificial heating and ventilating.

"Our foundry is pouring at some sections steadily from 7:30 A.M. until evening. A great part of our work involves heavy core casting, which causes a great amount of gas. But with splendid ventilation system, our labor turnover in the foundry during the hot months of 1925 was less than 1%.

"Our Buffalo Forge Equipment is highly satisfactory. Its flexibility insures correct heating and ventilating, whether the outside weather is 90 degrees or Zero."

OTHER BUFFALO EQUIPMENT

Unit heaters of various types, for wall, floor or ceiling mounting; air washers, exhaust fans, and mechanical draft apparatus of all kinds.

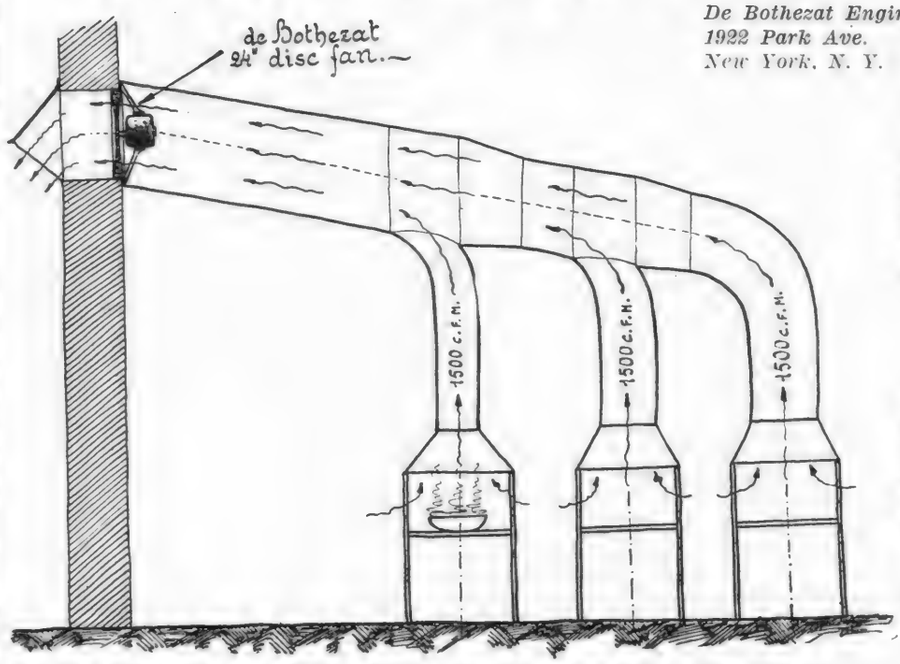
Our catalogs will prove useful in your office.
Why not ask for them now?

Buffalo Forge Company

480 BROADWAY, BUFFALO, N. Y.

In Canada—CANADIAN BLOWER & FORGE CO., LTD., Kitchener, Ont.

Read what Mr. Kuhrt has to say about
De Bothezat Disc Pressure Fans



Installation at the Premier Metal-Etching Company, L. I. C., New York.

De Bothezat Engineering Corp.
1922 Park Ave.
New York, N. Y.

Dec. 11th, 1925.

Dear Sirs:

We take pleasure in informing you that the disc fan that you installed for use with our three spray booths, is doing all that you claimed it would do. We are very well satisfied with the results.

Very truly yours,
PREMIER METAL ETCHING CO.
(Signed) O. C. Kuhrt.

And, as an endorsement of this letter, they ordered several more De Bothezat Disc Pressure Fans.

De Bothezat Disc Pressure Fans will develop the necessary static pressure to overcome duct resistance.

Write for catalogue H.V.

De Bothezat Impeller Co.
Incorporated
1922 Park Ave., New York City

In Offices

Radiators Wall-hung with **Little Giant** *Hangers*

Not only does wall-hung radiation in office buildings remove a gathering place for dirt, ashes, and paper,—but it also makes the laying of carpets and other floor covering a simple matter.

Wall radiators are best supported by Little Giant Hangers. The Little Giant is a one bolt, adjustable hanger and is so made that it will withstand any strain.

Distributed by United States Radiator Corp.
Sold by all leading jobbers

Little Giant
Manufacturing Co.
1927-31 Nicollet Ave. Minneapolis

JAMES M. SEYMOUR

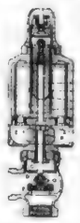
Established 1888
Lawrence St., Mechanic St. and Kirk Place,
NEWARK, NEW JERSEY

AUDITORIUM FANS, 36" to 120" to fit any square opening. SEYMOUR FANS sold subject to substantial discount. Furnished with suitable pulley or coupling for direct connection TWIN FANS include shafting and center bearing.

Special Fans for Cooling Towers, Heating Systems, Induced Draft, Forced Draft, Dry Rooms, Dry Kilns.

SEND for BULLETINS, PRICES, and DISCOUNTS

AUTOMATIC
HEAT REGULATION
ELECTRICALLY OPERATED


Packless Electric Valve

Whether it be for an isolated room or complete building, Gold's Control will give you that desired equable temperature. Energy derived from the 110 volt lighting current.

Write for General Catalog with Testimonials

Thermostat

GOLD CAR HEATING & LIGHTING CO.
BUSH TERMINAL
220 36th STREET BROOKLYN, N. Y.

Suspends from Steam Line

1 —*Factory; 9,000 square feet; 4 Modine Units.*

2 —*Machine Shop; 10,000 sq. feet; 5 Modine Units.*

3 —*Public Garage; 11,000 sq. feet; 3 Modine Units.*

4 — *Varnish Packing Room; 6,000 square feet; 2 Modine Units.*

Unparalleled Development of Industrial Heating

MODINE Unit Heater has brought to industrial plants an advanced method of heating that is unparalleled in its efficiency and simplicity. This new unit combines features that keep well apace with present day progress in the physical development of modern industrial plants.

The Modine Unit Heater replaces tons of dead weight with pounds of compactness as it weighs only 125 pounds.

Quickly installed without brackets, braces or structural work. Suspends from the steam line at any level desired. Two men and pipe wrench can do it in 30 minutes.

Air stream can be directed at any angle at will. 163,000 BTU per hour at 60 degrees temperature and 5 lbs. of steam pressure.

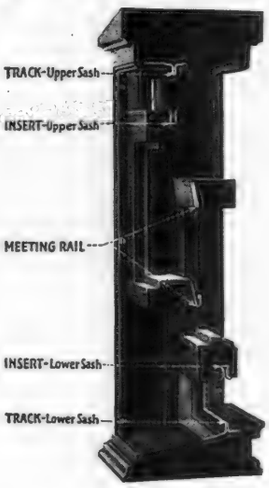
Write for Bulletin "A" which gives full details of this revolutionary type of heating.

MODINE MANUFACTURING COMPANY
HEATING DIVISION ThermoDine Concealed Heating RACINE, WISCONSIN

Chicago Sales Office, 720 Cass Street, Chicago, Ill.

MODINE
UNIT HEATER
FOR STEAM OR HOT WATER HEATING SYSTEMS

HIGGIN ALL METAL WEATHER STRIPS



The patent *Insert* strip makes Higgin Weatherstrips extra draft-tight

Higgin Weatherstrips are the only all-metal strips with the self-holding spring flange **Insert** in the sash. This **Insert** is important.

It makes a perfectly draft-tight contact at every point. Swelling or warping cannot prevent accurate fit and closure.

Without the Higgin Metal Insert the wooden groove will wear, swell or shrink, causing sticking or allowing seepage of air through the apertures.

Higgin Strips are "Metal against metal all the way round." Higgin-equipped windows and doors always keep cold air out and warm air in, operate smoothly and easily, and never need refitting.

HEATING ENGINEERS! You can safely guarantee a definite heating efficiency for your equipment when Higgin All-Metal Weatherstrips are installed. They keep all the cold air out and all the warm air in. They never lose their close fit by warping or shrinkage of frames. Every job is installed by trained Higgin men and guaranteed by the Higgin organization. Recommend Higgin All-Metal Weatherstrips to your customers.

The **HIGGIN** *Mfg. Co.*
Newport, Ky.
Toronto, Canada.
Manufacturers of Higgin All-Metal Weatherstrips and Higgin All-Metal Screens

For Ventilating Engineers Who Value Their Reputations

1. We make the Tangldust Air Filter, a filter that will not build up a resistance to the air flow and dry out between chargings.

2. Two stages of construction in the Tangldust Air Filter prevent the building up of a resistance to the air flow and a renewable oil pad keeps the filter from drying out between chargings. Both these features are exclusive and not found in cheaply constructed filters which are, at best, merely boxes filled with mineral wool or expanded metal.

3. The Tangldust Air Filter is a filter designed to meet the requests of ventilating engineers who realize that their reputations are made by the equipment they specify. Literature and prices on request.

Cooling Towers **Spray Nozzles** **Air Washers**

TANG L DUST AIR FILTERS
TRADE MARK REGISTERED

MADE BY THE COOLING TOWER COMPANY, INC.-15 JOHN STREET, NEW YORK

TURTLEBACK
TRADE MARK

THOUGH comparatively new, the TURTLEBACK ventilator has established a name for itself in the industry.

This is not an easy task. Engineers criticise and analyze each mechanical part; they dig deep into the fundamentals of a product—its simplicity of design, efficiency and economy in operation.

The TURTLEBACK was not found wanting by these experts.

The service of our engineering department is given without obligation.

VENTILATING PRODUCTS CO.
Not Inc.
2800 Cottage Grove Avenue, CHICAGO, ILL.

The Grand Rapids, Michigan, factory of the Kuchins Furniture Company showing two No. 330 Pecco Unit Heaters installed. There are also two of these heaters in the St. Louis plant of the Kuchins Company.

The Value of Circulated Warm Air

Only when all the air in a building is constantly circulated and recirculated through the heating unit is it possible to achieve a uniform distribution of heat.

The Pecco Unit Heater has been designed with this fundamental principle in mind and the cold air intake is therefore placed near the floor, at the cold air level. The cold air is drawn in by the fan wheel, passed upward around the steam coils and projected through the outlet hood into the normal warm air area, which lies between the "breathing level" and the ceiling.

This continuous cycle results in an even room heat, the temperature at points farthest removed from the heater being the same as in its immediate vicinity.

External view of the Pecco Unit Heater showing air intake fan and outlet head. Delivery of a maximum volume of air is achieved by the construction of the fan, which is provided with a large number of special shaped blades close spaced and efficiently pitched, revolving at a slow speed.

Send for new Pecco catalog—just off the press. Full of helpful heating information.

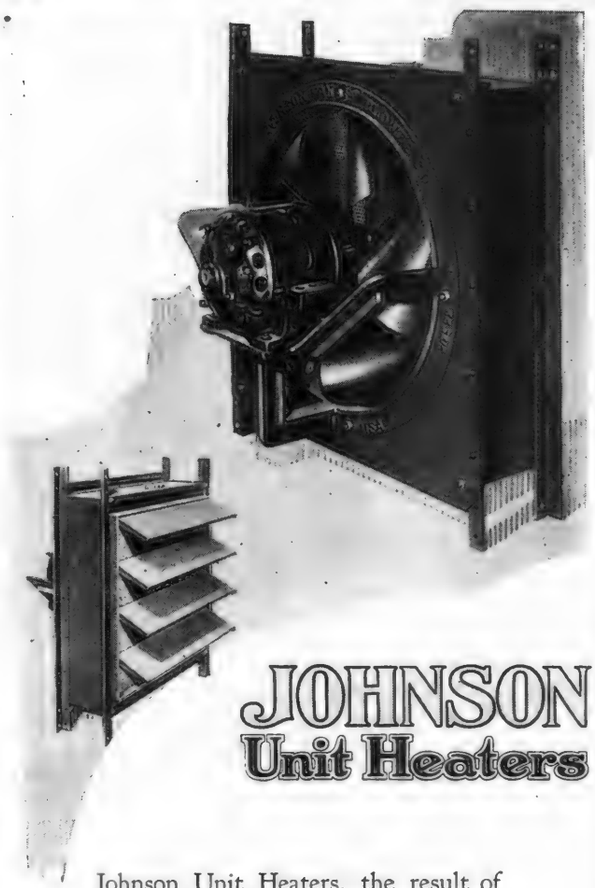
PECCO, INCORPORATED, 2980 North Market St., St. Louis, Mo.

PECCO UNIT HEATERS

"They Keep The Whole Place Warm"

Heat with Unit Heaters

Johnson Unit Heaters



JOHNSON
Unit Heaters

Johnson Unit Heaters, the result of years of heating and ventilating experience, represent an honest effort to make the *best*.

Nothing has been spared to make them the most economical heating unit that can be had.

Their cartridge type of radiator guarantees a maximum rate of steam condensation and a minimum resistance to the passage of the air current that sends a warm, *not hot*, stream to all parts of the room.

Their size—ridiculously small compared to their capacity—makes them easy to handle and install.

We have just issued a new catalog that tells the story of the economy that comes from using JohnsonUnit Heaters. Ask for it. Will gladly send you a copy.

Johnson Fan & Blower Co.
MANUFACTURERS OF FANS & BLOWERS FOR ALL PURPOSES
1325 W. Lake St ~ ~ ~ Chicago Ill.
Offices In Principle Cities

Johnson Unit Heaters

HARTMANN
RADIATOR BRACKETS

The radiator hangers used in the construction of a building furnish a good guide in determining the quality of the job. Hartmann Brackets are always to be found in a high-class installation because Architects, Engineers and Contractors have experienced that Hartmann Radiator Brackets are accurately and strongly made, are economical and always dependable.

THREE STYLES

AR NR NV

Write for descriptive circular and price list

Charles Hartmann Co.
975-993 Dean Street - Brooklyn, N. Y.

Sterlco
TRADE MARK

THE THERMOTROL

The past heating season has proven the efficiency of the Thermotrol and demonstrated its qualities as a room temperature regulator.

We now announce the new model Thermotrol, improved in appearance, more smooth in operation, yet maintaining the same principle as the original Thermotrol.

Write for Bulletin No. 38.

STERLING ENGINEERING COMPANY
1636-44 HOLTON ST., MILWAUKEE, WISC.

This is the Pioneer

The only unit heater into which is built all of the improvements of the original patentee

Skinner Bros. Two-fan Four-inlet Steam Coil Heater

Made in designs and sizes to fit every heating and air conditioning requirement of the modern industrial plant.

Manufactured only by

SKINNER BROS. MFG CO., Inc.

The Pioneer Manufacturers of Unit Heaters.

Home Office: 1404 S. Vandeventer Ave., St. Louis, Mo.
Eastern Office: 1014 Flatiron Building, New York City.
Factories at St. Louis, Mo., and Elizabeth, N. J.

Baltimore	Chicago	Detroit	Philadelphia	Seattle
Boston	Cleveland	Indianapolis	Pittsburgh	Spokane
Buffalo		Kansas City		Washington

SPRING-LIKE TEMPERATURE THE YEAR ROUND

The double function of the Dwyer *Twinfan* Unit Heater—supplying uniform heat in winter and good ventilation in summer—enables users to maintain a moderate spring-like temperature in their factory or garage throughout the year.

Heat control is instantaneous—turn the switch, and the heat is on or off. Opening windows (which is the finest way in the world to waste heat) is never necessary to keep a *Twinfan*-heated building at the right temperature—simply turn off the fans. The unit gives off sufficient heat by gravity to keep the building at a comfortable temperature.

In the summer the *Twinfan* Unit Heater serves as a ventilator. By operating the fans in summer a constant circulation of air is maintained, and this recirculation has a cooling effect in the building.

Twinfan Units give the kind of satisfaction which builds up a profitable repeat order business for the heating engineer who installs them.

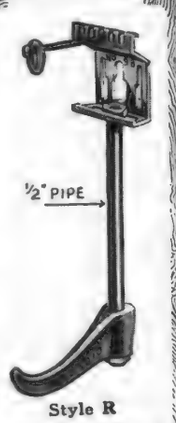
Let our engineers assist you on your next heating job.

DWYER EQUIPMENT COMPANY
4534 W. NORTH AVE. CHICAGO, ILL.

E-Z
RADIATOR HANGER

WHY waste time setting anchor bolts accurately? Use E-Z Hangers and put the anchor bolt in **about** the right place.

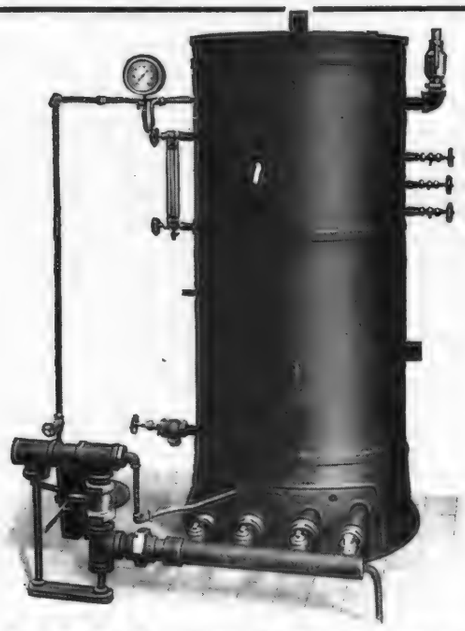
The E-Z adjustment with a ½ inch pipe takes care of both height and lateral variations.



Style R

HEALY-RUFF CO.
772 Hampden Avenue
ST. PAUL, MINN.

"A big help to Customers"



KANE Gas Fired Automatic Steam Boiler
Highest Efficiency

The first KANE Gas Fired Steam Boiler was manufactured over twenty five years ago and since that time over 5600 have been installed in this and other countries.
KANE boilers are rendering efficient and valuable service to their satisfied owners and can be identified with every branch of industry where steam, at high or low pressure is required for industrial or domestic purposes. *Send for descriptive literature.*

Monarch Sales & Engineering Co.
Formerly Ofeldt Gas Boiler Sales Corp.
363 W. Erie St., Chicago, Ill.
2010 Locust Street, St. Louis, Mo.
Southern Industrial Engr. Co., American Trust Bldg., Birmingham, Ala.

PATENTED FEATURES, BASIC PRINCIPLES *and* EXCLUSIVE REFINEMENTS *which are distinctive merits of* ILG UNIT HEATERS

— One Guarantee Covers the Complete Unit —

BUILT BY AN ORGANIZATION which has long specialized in heating and ventilating equipment, the ILG Unit Heater represents a distinctive type of blast heating which has won nation wide recognition because of its economical installation, low power consumption, flexibility and efficiency. Up to date more than 8,000 ILG Unit Heaters have been sold.

Low Power Costs: The all-important feature of the ILG Unit Heater is the fact that the air is drawn over the heating coils at very low velocity and discharged at high velocity, which insures minimum power consumption and maximum heating capacity.

Patented Adjustable Deflector: A patented adjustable deflector controls the placement of the heat waves at their source. As the air at the breathing line warms, the deflector can be raised to allow the heat waves to straighten out, easily reaching a distance of 50 to 60 feet.

Perfect Ventilation: In warm weather ILG Unit Heaters can be used for cooling by operating the fans without steam or hot water in the coils. If connected with the outside air through the sidewall or roof, perfect ventilation is secured without any floor dust. Every ILG Unit Heater can be easily changed to a ventilating unit by connecting through roof or sidewall.

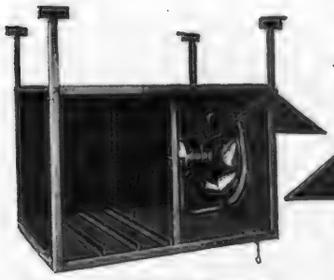
This is the ILG Self-Cooled Motor Propeller Fan used in ILG Unit Heaters. It is the only fan manufactured with the motor fully enclosed, yet correctly cooled thereby protecting it from dirt, dust, grease and acids. Note the vent pipe which provides a direct channel leading to the heart of the motor. The vacuum created at the axis of the fan draws a current of cool air through this vent pipe which is then carried away by the general exhaust. This all important feature is broadly protected by basic patents and insures efficiency and economical upkeep. ILG motors are made in the ILG Plant and are specially designed for driving fans.

Easy to Install: Any steamfitter can install ILG Unit Heaters. The cabinet is easily assembled and the fan and coils correctly placed without much fitting.

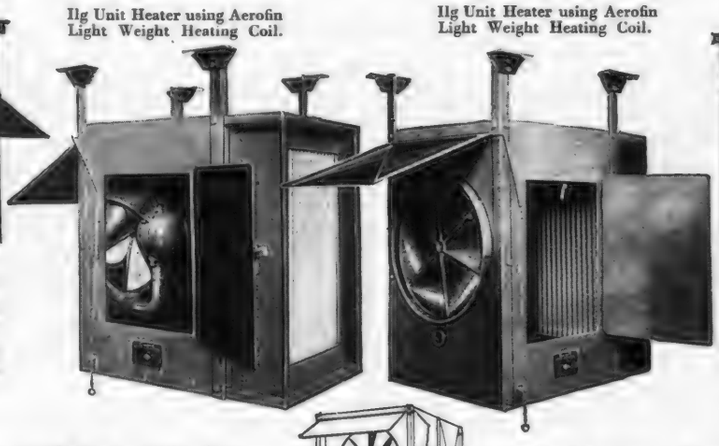
No Floor Dust: There are no drafts, or circulating of floor dust for the reason that ILG Unit Heaters take the air horizontally, at low velocity, seven to eight feet above the floor; at the same time delivering, spreading and holding the tempered air at the breathing zone.

No Floor Restrictions: For the same reason, the efficiency of ILG Unit Heaters cannot be impaired by floor obstructions, and the action of the Unit is the same whether it is supported on the ceiling, sidewall or floor.

Guarantee: We are the sole manufacturers and patentees of ILG Unit Heaters. Our guarantee is all-inclusive, covering the motor, fan deflector and cabinet. The complete outfit is made by one organization, and sold under one name plate — one responsibility.



Interior view of Ilg Unit Heater cabinet Vento type with side removed showing the Ilg Self-Cooled Motor Propeller Fan — the only fan made with a fully enclosed, self-cooled motor and which is an exclusive feature of the Ilg system.



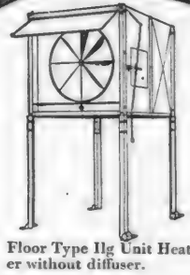
Ilg Unit Heater using Aerofin Light Weight Heating Coil.

Ilg Unit Heater using Aerofin Light Weight Heating Coil.

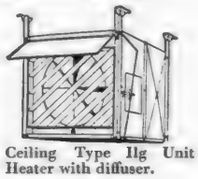
Another interior view of the Ilg Unit Heater showing the Vento heating coils in place. All parts of the cabinet are standardized — thus, the entire Unit is constructed so that the job of setting up is entirely one of assembling.

Two Types: ILG Unit Heaters are made in two types. One is for ceiling or sidewall suspension. The other is a pedestal model for floor installation. The only difference is in the mounting. The pedestal model is more flexible because it is portable. In no way does it obstruct floor space.

Choice of Coils: You can have your choice of Vento, Aerofin or high pressure pipe coils without making any changes in the basic construction of ILG Unit Heaters, and with only minor changes in the dimensions.



Floor Type Ilg Unit Heater without diffuser.



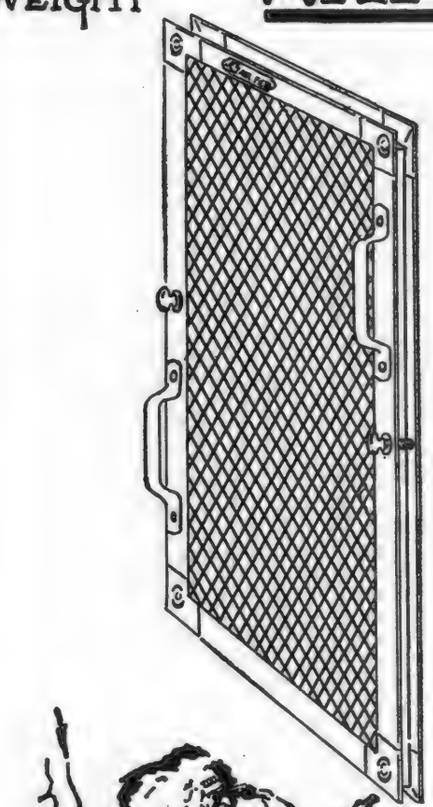
Ceiling Type Ilg Unit Heater with diffuser.

Estimates Submitted: Send us the dimensions of your building and our Engineering Department will submit an estimate of the number of heaters necessary for your specific requirements. At the same time we will send you a floor plan of the proposed installation with an itemized statement of the cost.

ILG ELECTRIC VENTILATING CO. 2858 N. CRAWFORD AVE. CHICAGO, ILLINOIS

Duro

FEATHER-WEIGHT **WAFER**



EFFECTIVE, STRONG, AND ENDURING ARE THESE COPPER MEDIA AIR FILTERS.

DURO AIR FILTER CO

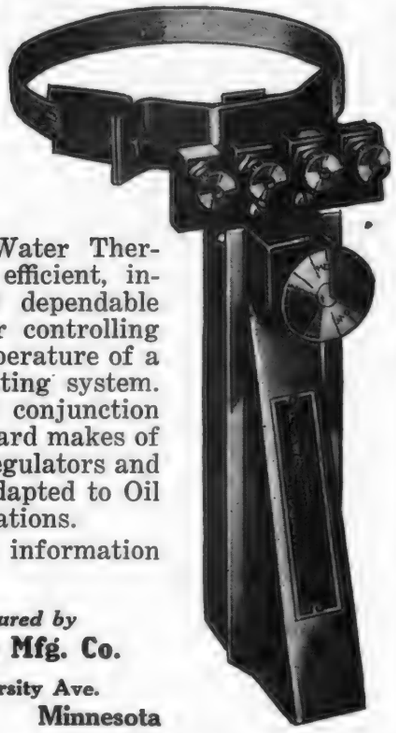
3151-3155 SHIELDS AVE

CHICAGO

I. E. S.

W-M-C
Water Thermostat
For Dual Control

Clamps on the Riser



The W-M-C Water Thermostat is an efficient, inexpensive and dependable instrument for controlling the water temperature of a hot water heating system. It operates in conjunction with the standard makes of electric heat regulators and is especially adapted to Oil Burner installations.

Write for full information and prices.

Manufactured by

The White Mfg. Co.

2362 University Ave.

St. Paul, Minnesota

Keep Refrigerating Systems on the Job *with*

TRADE MARK

BRISTOL'S

REG. U. S. PAT. OFFICE

Cooling and refrigerating systems, both large and small, require constant checking to maintain efficient operating conditions.

Installed at important locations in the system, Bristol's Recording Instruments immediately show when wrong tendencies occur and enable you to quickly locate the trouble. They are a direct means of protection against faulty conditions.

The simplicity and ruggedness of construction permit these instruments to give many years of constant service without repairs or adjustments.

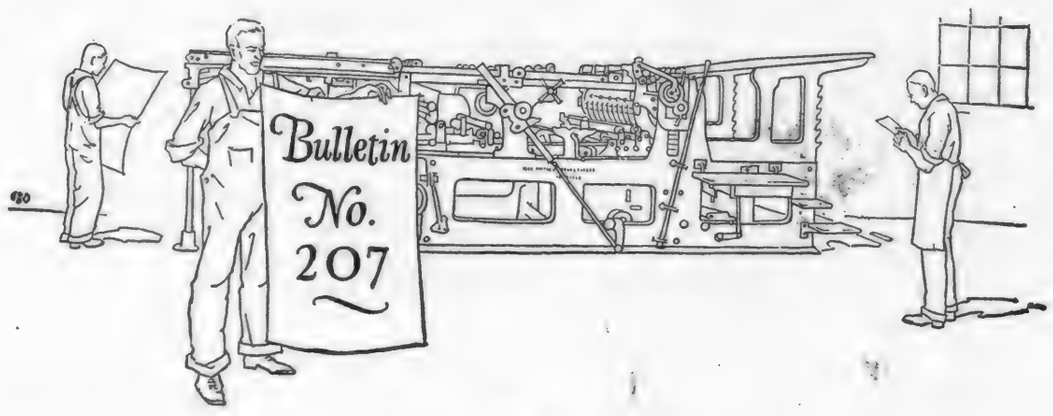
Our engineers can show you where Bristol's may be used to good advantage.

The Bristol Company *Waterbury, Connecticut*

FOR 36 YEARS — Ask Any Technical Engineer — MAKERS OF

BRISTOL'S RECORDING INSTRUMENTS

Universal Heating & Ventilating Unit



Just off the Press

OUR NEW BULLETIN, NO. 207, introducing the new quiet-operating, brushless type, single phase motor is now ready for distribution. It fully illustrates this new motor and contains complete electrical data along with a typical specification.

Where shall we send your copy?

Universal Heating and Ventilating Unit is obtainable thru Sales Offices of the AMERICAN BLOWER Co. in the principal cities throughout the United States and Canada. For a copy of Bulletin No. 207 or other information write either to us or to the nearest AMERICAN BLOWER OFFICE.

JOHN J. NESBITT, INC.

213 NORTH VERMONT AVE., ATLANTIC CITY, N. J.

405 LEXINGTON AVE., NEW YORK CITY

The new ACE Air Filter

(Formerly called General Air Filter)

Installation of 32 cell ACE AIR FILTER for 500 Madison Ave., New York City.

A distinct advance in modern filter design that insures the delivery of CLEAN VENTILATING AIR at a very low resistance to the air flow.

It will maintain a high efficiency under all conditions and will reduce the power required for driving fans.

It is extremely easy to clean.

Tested in a special laboratory equipped with dust detecting apparatus, loaned by the U. S. Bureau of Mines.

Specified by leading heating and ventilating engineers.

Consultation regarding your dust removal problem invited. Visit our laboratory to witness tests. Write for Bulletin.

General Air Filters Corp.
MANUFACTURERS
Air Purification Equipment
110 WEST 42ND STREET NEW YORK CITY

Vapor Heating

assurance doubly sure when tied to the boiler with a

Wiley Safety Vent Vapor Regulator

Write for your copy of booklet describing the Wiley line of vapor heating specialties.

peerless quality product manufactured and sold exclusively by

The Simplex Heating Specialty Co.
(INC.)
Lynchburg, - Va.

Radiator Brackets

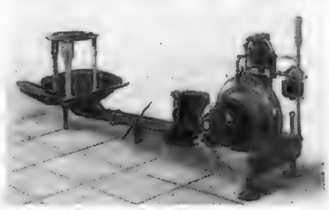
York Wrought Steel Radiator Brackets will save you money in installing radiators, for no wall strips are required. Brackets fasten with lag screws or expansion bolts, and oval bolt holes allow adjustment for leveling or pitching. They are the lowest priced brackets on the market.

Twelve sizes carried in stock. Write for catalog, prices and discount.

York Heating & Ventilating Corp.
1506 Locust Street, PHILADELPHIA

The CHALMERS OIL BURNER

was among the pioneers in the oil burner industry and their present popularity is based on the permanent, satisfactory service they have delivered through the years.



Approved by Underwriters Laboratories. Responsible Representatives will find the Chalmers Agency a profitable one.

CHALMERS OIL BURNER CO.
Minneapolis, Minn.
Member American Oil Burner Association.

More Heat — one fifth the weight

COMET UNIT HEATERS afford a simple method of positive heating with *known costs*. A uniform temperature is maintained with an economy that appeals to all owners.

COMET UNIT HEATERS do not encroach on valuable space and have a flexibility of great value.

Lower temperatures are permitted at night or when space is not in use as COMET UNIT HEATERS will *quickly* raise the temperature to the desired level.

Write for bulletin 85 that gives capacities, prices and general data.

Type ME Fan

Write for 32-page book containing valuable data on air moving, together with a description of the new Type ME Fan—the fan with the remarkable characteristic curve.

Heat with Unit Heaters

NEW YORK BLOWER COMPANY

2242 South Halsted Street, Chicago

SOUTH SIDE TRUST
AND SAVINGS BANK
CHICAGO, ILLINOIS

ALBERT SCHWARTZ,
ARCHITECT AND ENGINEER.

THIS BUILDING IS EQUIPPED WITH ELECTROZONE VENTILATION.

Let us prove to you that ELECTROZONE System supplies superior ventilation and cuts fuel cost 50 percent; also provides substantial reduction in first cost of plant through the use of smaller boilers and less heating surface.

Manufacturing exclusively—ELECTROZONE Ventilating Ozonators, ELECTROZONE Furnace Ozonators, ELECTROZONE Portable Ozonators, ELECTROZONE Water Sterilizers, ELECTROZONE Industrial Ozonators.

The Air Conditioning and Engineering Company

Main Office and Factory: 2914 South Jefferson Avenue, St. Louis, Mo.

Costs Less On Every Count

Economy and satisfactory heating service—these are the two main factors that have led so many engineers and plant owners to specify the Mueller Direct-Fired Forced Air Unit for industrial heating, instead of an elaborate steam or hot water system.

Both installation and operating costs are lower. It requires no radiation. Burns low grade fuel. No danger of freezing, breakages or shut-downs. No licensed engineer is needed to run it. Forced circulation of healthful, moist, warm air throughout the plant increases efficiency of workmen.

A positive circulating system for peak loads and quick heating periods is combined with a gravity system for night operation or when building is unoccupied. The Mueller Forced Air Unit may be operated singly or in batteries, to obtain a satisfactory temperature.

Write for descriptive literature. Our Engineering Department will gladly confer with you regarding your heating requirements.

L. J. MUELLER FURNACE COMPANY

267 Reed St. **Established 1857** **MILWAUKEE, WIS.**

BRANCH OFFICES:

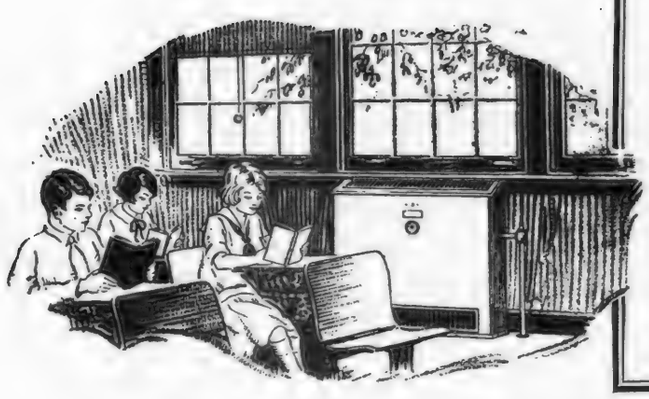
Chicago, Detroit, St. Louis, St. Paul, Minneapolis, Ft. Collins, Colo., Salt Lake City, Seattle, Baltimore.

MUELLER

• Direct-Fired • Forced Air Unit

**A measured volume of fresh air,
warmed or not, as required,
when you want it, *where* you want it,
without drafts, without waste of fuel**

—that is what you get with PEERVENT *Heating and Ventilating Units*



"I AM pleased to say that I have been using Peerless Units for a number of years and have found them very satisfactory in every respect. I consider that they are at all times a little in advance with improvements.

"In my opinion any unit ventilating system (if as perfect as the Peerless) is far superior to any other method. You have positive ventilation for each room. Atmospheric or weather conditions do not affect this system, as in a central fan or gravity system. I consider the cost of operation much more reasonable than a central system, as rooms on the various exposures can be controlled to meet requirements.

"I consider that the installation of the Peerless System is cheaper in two ways—saving in flue construction, and also in headroom and space in the basement, as a rule, which ducts and fan rooms take up."—*Jacob J. Vreeland, Architect, Dover, N. J.*

Send for the PeerVent Catalogue. If you wish to see our local sales representative, please so state.

PEERLESS UNIT VENTILATION CO., INC.
Pioneers in Unit Ventilation
Skillman Avenue and Hulst Street
Long Island City, N. Y.

CHICAGO
808 Monadnock Bldg.

PITTSBURGH
301 House Building

DES MOINES
520 Securities Building

BOSTON
100 Boylston St.

CLEVELAND
1836 Euclid Avenue

PORTLAND, ORE.
927 Board of Trade Bldg.

SPRINGFIELD, MASS.
196 Worthington St.

DETROIT
723 Lafayette Bldg.

MINNEAPOLIS
240 7th Avenue South

TORONTO, CANADA, Darling Bros., Ltd., 77 York St.

Mail This Coupon for Catalogue

Name.....

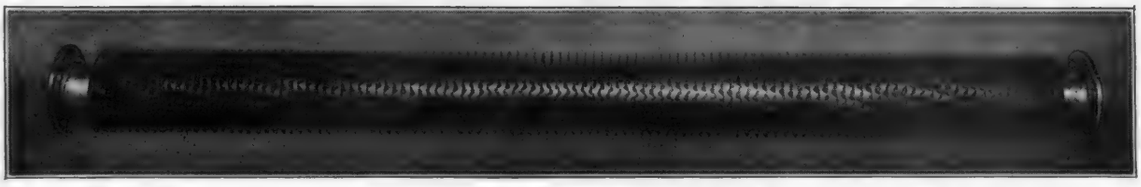
Address.....

HV-9-26

PEERVENT

Heating and Ventilating Units

Figure on finned tubes



SCHUTTE KOERTING

RADIAFIN TUBES
for heating or cooling air

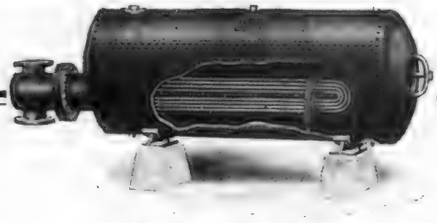
have 6 to 10 times as much surface as plain tubes of same size.

6 sizes—¾″ to 3″—lengths up to 15 feet—plain or flanged ends with or without headers.

The radial fins insure maximum heat transfer

These tubes will be on display in Machy. Hall at the Sesquicentennial Exposition.

SCHUTTE & KOERTING CO., 1153 Thompson St., PHILADELPHIA, PA.



"Frank"ly

speaking O.E.F. U-Tube and Straight Tube heaters are of a decidedly efficient character. Made of flange steel throughout.
Write our engineering department for full details.

O. E. Frank Heater & Engineering Co., Inc.
Factory and Offices at Buffalo, N. Y.

NOW is the time! Before WINTER!

Don't put off installing a VICTOR Damper Regulator until mid-winter. Put it in NOW. Save money. Save coal. Write for NET price list.

See classified directory for all Atlas Regulating Devices.

ATLAS VALVE COMPANY
REGULATING VALVES FOR EVERY SERVICE
281 South St., Newark, N. J.

Victor No. 1
For pressures up to 150 lb.

A Dependable Line of Heating Specialties

Stay-Rite Heating Specialties are dependable because they are made right and in strict accordance with heating requirements. They have long since passed the experimental stage. And over many heating seasons they have justified the confidence of their owners and proved the high efficiency of the Stay-Rite Line.

Write for literature and prices

The Ideal Heating Equipment Co.
1250 West 4th Street CLEVELAND, OHIO

The Rose Court and main dining room in the House of Crane, Oakland, California,—one of the city's newest and most fashionable restaurants. . . . Reed Air Filters may be installed in old air-ducts as well as new, inside or outside buildings—wherever any small space is available. Highest air-cleaning efficiency and lowest operating resistance assure greatest economy and satisfaction.

Reed *Clean* Air *for* House *of* Crane

EVEN after the busiest day, immaculate freshness greets the evening guest at the House of Crane. For Reed Air Filters eliminate 97% of all dust and soot from the air, keep these fine interiors spotlessly clean and protect the health of patrons and employees by providing pure, bacteria-free air in volumes impossible with ordinary ventilation.

Reed Air Filters already installed and adapted to the needs of almost every type of building and branch of industry can furnish you with a fund of definite and valuable information whatever your air-cleaning requirements may be. Send for the Reed Blue Book—it tells the story.

REED AIR FILTER COMPANY, *Incorporated*
215 Central Ave., Louisville, Kentucky. *Offices in Principal Cities*

Reed Air

TRADE MARK

filters ALL METAL

Use This

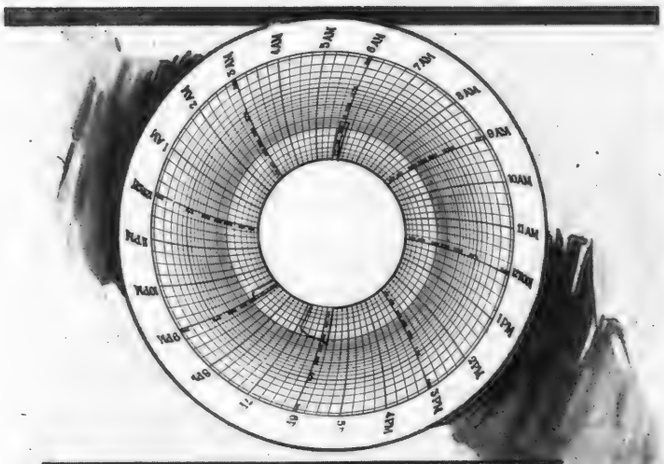
REED AIR FILTER CO., *Incorporated*
215 Central Ave., Louisville, Kentucky

Send, without obligating me, a copy of the Reed Blue Book.

Name..... City ..... Possible Use.....

Company..... State.....

How to serve more customers with the same amount of Steam

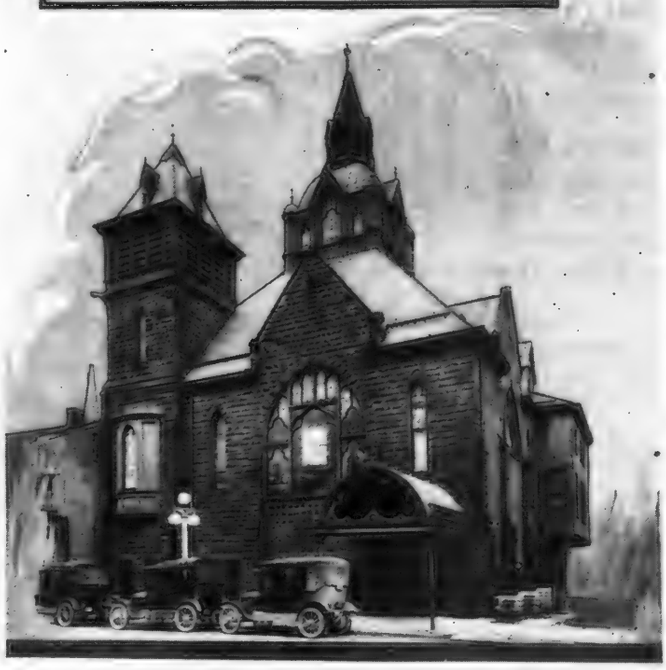


THE chart above covers 24 hours ending 8:30 A. M. Wednesday, April 13, 1926, in the Congregational Church, Springfield, Ohio. Average outside temperature 60°; inside temperature, thermostat set for 55°.

The "Master" Control Valve opened and admitted steam only 3 times—for a total of 1 hour 50 minutes.

If no customer can use more steam than is really needed, you will save in the boiler room, in mild weather, and in cold weather will have enough steam to serve more customers than you can now take on. And complaints about big bills, from your customers, will stop!

Think that over—and ask us for more particulars.



CENTRAL HEAT APPLIANCES

J. C. Horning, Engineer

343 S. Dearborn Street, Chicago, Ill. (3432)

BOOKS ON HEATING AND VENTILATING

THE DESIGN OF GRAVITY-CIRCULATION WATER HEATING SYSTEMS. By F. E. Giesecke, Ph. D. A book, remarkable for its conciseness and clearness of expression, which contains the essence of the information needed for the proper design of gravity water heating systems, based on the principle that the frictional resistance must equal the force maintaining flow. The importance of the presentation is evidenced by the fact that the entire water heating section of the A. S. H. & V. E. Compendium of Modern Practice has been discarded and replaced with a new section by Dr. Giesecke, embodying the methods here presented in detail. 64 pages of text and 10 pages of tables and charts. Price, $8.00.

PLUMBERS' HANDBOOK. By Samuel E. Dibble. This work contains valuable data for the heating engineer and estimator, architect, building contractor and sheet metal worker, as well as for the plumber. Each subject is treated by a specialist, the section on Pipe Standards and Pipe Dies by F. N. Speller and that on Heating by Alphonse A. Adler. Size 4 x 7 in. 629 pp. 316 ills. Cloth, $4.00.

MECHANICAL EQUIPMENT OF BUILDINGS. Vol. 1. Heating and Ventilation. By Louis A. Harding and Arthur C. Willard. One of the most complete treatises ever published on this subject. Written for the practicing engineer, as well as for the student. Size 7 x 9½ in., flexible binding. 621 pages and profusely illustrated. Price $6.00.

Vol. II. Power plants and Refrigeration. An equally complete treatise, illustrating and describing in detail modern power-plant design and refrigerating practice. Size 6¾ x 9¼ in., flexible binding. 766 pages, many illustrations. Price $6.00.

Vol. III. Miscellaneous Building Equipment in preparation, including lighting, elevators, vacuum cleaning, sprinkler systems, plumbing, etc.

HEATING AND VENTILATION. By the late John R. Allen and J. H. Walker. This is the second edition of this work and has been brought up to date in every particular, including the latest radiator transmission factors put out by the Research Laboratory of the A. S. H. & V. E. and the Hill synthetic air chart testing method. Especially adapted for use as a text book. Size 6 x 9 in. 322 pages Cloth, $3.50.

STEAM PIPING ITS ECONOMICAL DESIGN AND CORRECT LAYOUT. By A. Langstaff Johnston, Jr. An analysis of the factors governing the flow of steam in pipes with numerous large curves for use in solving the problems of practical installation and determining the most economical size of pipe for any given set of conditions. Pp. 62. Size 5 x 7½ in. Cloth, $2.00.

DESIGNING, HEATING, AND VENTILATING SYSTEM. By Charles A. Fuller. A treatise on the practical application of the engineering rules and formulas in every day use, in laying out steam, hot water, furnace and ventilating equipment for buildings of all kinds, presented in a simple manner. Price $3.00.

STEAM POWER PLANTS: Their Design and Construction. By Henry C. Meyer, Jr., M. E. Third edition, fully revised. One of the standard works on the design and construction of power plants. Covers proportioning boilers, selection and writing specifications for steam engines, selection and arrangement of auxiliaries, construction of chimneys, coal handling, etc. 219 pages. Size 6 x 9 in. Illustrated with folding plates. Price, $2.00 postpaid.

PRACTICAL STEAM, HOT WATER HEATING AND VENTILATION. By Alfred G. King. Containing 396 illustrations. The book is a working manual for heating contractors, journeymen, steam fitters, architects and builders. Describes various systems of heating and ventilation and includes useful data and tables for estimating, installing and testing such systems. 8vo. 367 pages. Price, $4.00.

MECHANICS OF HEATING AND VENTILATING. By Konrad Meier. Including a series of ten charts containing data relating to the flow of water, steam and air, collected by Mr. Meier during an experience of 26 years in heating and ventilating work, both in this country and abroad. Each of the charts replaces a series of tables on the subject, giving at a glance the results of a calculation from any combination of factors. 161 pages, illustrated, with ten large charts. Size 6 x 9 in. Price, $5.00. Separate sets of charts printed on cloth, with lines in different colors and mounted on boards. Single charts. $1.50. Sets of ten, $15.00.

HOUSE HEATING WITH OIL FUEL. Presents in concise form the meat of the available information on the various phases of the problem of oil burners as a source of heat for homes. By P. E. Fansler, E.E., Associate Editor, The Heating and Ventilating Magazine. Second edition, 63 pages, with charts and illustrations. Price $1.00.

HANDBOOK FOR HEATING AND VENTILATING ENGINEERS. By James D. Hoffman. Fourth edition of this important work entirely rewritten and reset. A standard manual covering theory and practice, with special chapters on heat losses, furnace heating, water and steam heating, mechanical vacuum heating, mechanical warm-air heating, temperature control, electrical heating and refrigeration. With appendix of 75 tables. Size 4½ x 6¼ in. Pp. 478. Price $4.50 postpaid.

HANDBOOK OF THE NATIONAL DISTRICT HEATING ASSOCIATION. Devoted to data on all phases of Central Station heating work, including generation, distribution, utilization, meters and water heating, compiled by the Association's Educational Committee. All new and revised data for this book will be supplied free for five years. Bound in leather, with six-ring binder. Price $5.00, postpaid.

THE HEATING and VENTILATING MAGAZINE
1123 BROADWAY, NEW YORK

CHAMBERLIN Equipment— Essential *for* HEATING Efficiency!

Stevens Hotel, Chicago, Ill. 3000 rooms. Holabird & Roche, Architects. Geo. A. Fuller Co., Contractors. Largest hotel project in the world to date. Chamberlin equipped throughout — 90,000 ft. of Chamberlin Metal Weather Strips.

BUILDERS of the mammoth 3,000-room Stevens Hotel recognized the value of Chamberlin equipment as related to heating efficiency and fuel economy. Therefore, they equipped this building throughout with Chamberlin Metal Weather Strips, using approximately 90,000 ft. or 17 miles of weather stripping.

The logic of their procedure is apparent when the following facts are considered—a window of average size will leak 47 cu. ft. of air per minute when the wind is blowing only 15 miles per hour. Chamberlin Metal Weather Strips, as installed by Chamberlin experts, shut out from 85 to 95% of this leakage. This has been proved time and time again by rigid air leakage tests on 10 to 33 year old Chamberlin installations.

Chamberlin Metal Weather Strips, preventing the in-leakage of cold air and the out-leakage of heated air, save anywhere from 20 to 40% in yearly heating costs besides making possible even, uniform heating throughout all rooms and corridors of a building.

Lifetime Guarantee

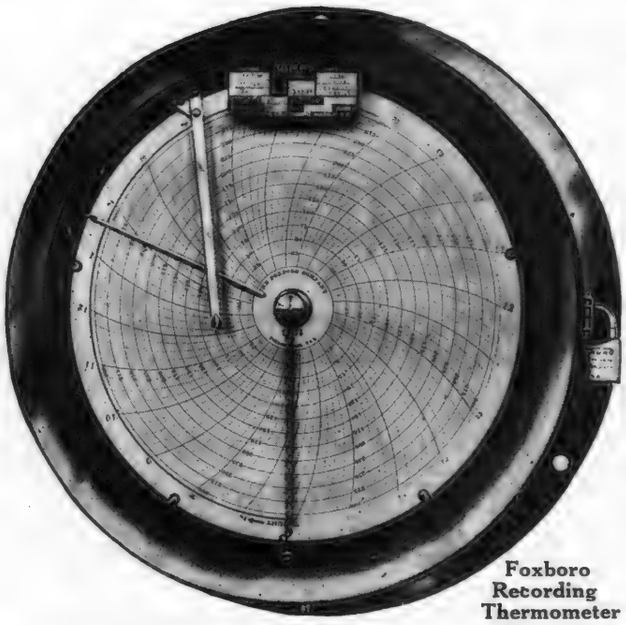
Chamberlin manufactures its weather strips, installs them, assumes full responsibility for correct installation—and guarantees and services its equipment for the life of the building.

Chamberlin Metal Weather Strip Company

West Lafayette Blvd., Detroit, Michigan

100 Sales and Service Branches throughout the United States

CHAMBERLIN METAL WEATHER STRIPS "SINCE 1893-THE STANDARD"



Foxboro Recording Thermometer

Instrument Accuracy Demands Fixed Centers of Rotation

ACCURACY in a recording instrument depends upon the ability of the pen to follow the graduated scale and the time arc of the chart.

To accomplish this there must be a definite and fixed relationship between the center of rotation of the pen arm and of the chart itself.

The motion of the Foxboro actuating movement is transmitted to a shaft which forms a definite and fixed axis of rotation for the pen arm. No other actuating movement has been developed which produces equally satisfactory results.

This construction, also, eliminates vibration. It makes possible a simple micrometer adjustment that does not alter the effective length of the pen arm.

Axes of pen arm and chart rotation are located by jig on the same base. Alignment is simple and positive. The relationship is always the same. All parts are interchangeable.

The controlled motion of the pen arm, coupled with the fact that all Foxboro actuating movements are guaranteed permanent in calibration, enables Foxboro Instruments to maintain an accuracy to within less than 1 per cent of total scale range.

Foxboro Instruments give you the utmost in instrument accuracy and dependability.

THE FOXBORO CO., INC.

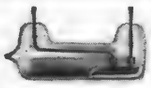
Neponset Avenue, Foxboro, Mass., U. S. A.

New York Chicago Philadelphia Boston Pittsburgh
Cleveland Tulsa Rochester Atlanta
San Francisco Los Angeles Portland, Ore.

FOXBORO

REG. U. S. PAT. OFF.

THE COMPASS OF INDUSTRY

Mercury  Switches

CON-TAC-TOR

High Voltage Controls open 110 or 220 V. Circuits because they use the **Mercury Switch** for opening the **Motor Line**

Thermoswitch Screws to Wall

Aquaswitch Clamps to Riser

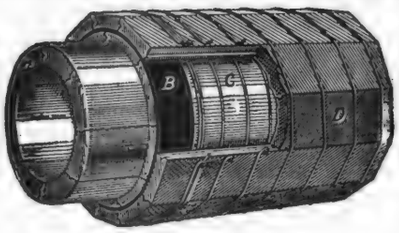
A complete LINE of Automatic Controls including Thermal Safeties and Magnetic Gas and Oil Valves.

Get Catalog OB7

ABSOLUTE CON-TAC-TOR CORPORATION

ELKHART, INDIANA

Wyckoff's Improved Cypress Covering



Lasts as Long as The Pipe Itself

As well as being highly efficient in its application, Wyckoff Improved Cypress Steam Pipe Covering withstands all conditions attending steam pipe trenches. All engineers who know Wyckoff Pipe covering specify it because it lasts.

A. WYCKOFF & SON CO. ELMIRA, N. Y.

ROSS Crosshead-GUIDED Expansion Joint Excels in

Design, Construction and Workmanship
Over 60% of sales—Repeat Orders
Once Used—Always Demanded
Every Purchaser—A Customer

ROSS HEATER & MFG. CO., INC., BUFFALO, N. Y.

New York, Chicago, Philadelphia, Boston, Cleveland, St. Louis, Detroit, Pittsburgh, Baltimore, San Francisco, Seattle, Denver, Salt Lake City, Omaha, Montreal, Toronto.

Less Radiation and Less Fuel Heat These Insulexed Homes

Home of H. J. Osterlund, Ft. Dodge, Iowa

The ceiling of Dr. Wilson's home on Berry Rd., St. Louis County, is insulexed 2" thick

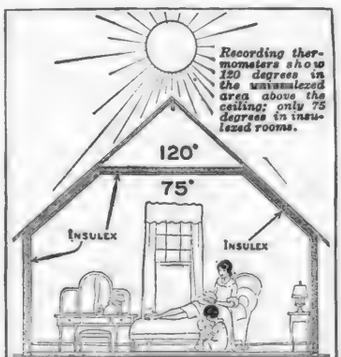
Insulexed home of R. J. Rankin Toledo, Ohio

Walls and ceilings completely insulexed in this residence on Balfour Rd., Detroit, Mich.

Home of E. C. Harms, 2335 Lincolnwood Drive, Evanston

"COOL bedrooms on the second floor." "Attic rooms now pleasant in hottest weather." "Even temperature at all times, with normal heating." "Lower fuel bills." "Reduced radiation, and the cost of Insulex saved."

Such experiences are common to owners who enjoy the summer and winter advantages of complete and effective insulation. Heating engineers find that if a house is Insulexed, they can install less radiation, and still meet builders' requirements.


Recording thermometers show 120 degrees in the uninsulexed area above the ceiling; only 75 degrees in insulexed rooms.
120°
75°
INSULEX
INSULEX

Comfort in summer

Thick gypsum insulation has brought hitherto unheard of comfort. Insulex not only shuts out the heat from direct rays of the sun, but prevents heat stored up during the day in the roof, from radiating down into rooms during the night, the real cause of hot bedrooms long after the sun has gone down.

Economy in winter

In winter, this same thorough insulation keeps cold out, and permits 70° temperature day and night, with normal heating. The cost of material and labor may be saved in the smaller heating plant and less radiation required, with further saving year after year in fuel bills. Recording thermometer records, both summer and winter, taken in typical homes under ordinary living conditions, are available to engineers and builders.

UNIVERSAL GYPSUM & LIME CO., *Chicago*

Dept. 19, 111 West Washington Street

Insulex is poured between rafters, in the walls, under the floors. It is sound-deadening, will not burn, and makes frame construction practically fireproof. Vermin and rot-proof.

INSULEX (UNIVERSAL GYPSUM) GYPSUM INSULATION

REG. U. S. PAT. OFFICE

Mail this coupon

UNIVERSAL GYPSUM COMPANY.
111 W. Washington St., Chicago
Send me your booklet, "Cutting your Fuel Costs," facts about gas heating, and thorough insulation.

Name.....

Address.....

City.....State.....

CONFIDENCE

Confidence is one of the most constructive forces in business. It is established in peoples' minds by satisfactory experience with products which preserve the same standard of value year after year.

The confidence of the trade in Commonwealth Lavigne Radiator Valves is founded on years of consistent performance. It has been earned by manufacturing only high-grade radiator valves, and sparing no effort to maintain their quality regardless of market fluctuations.

You can install Commonwealth Lavigne Radiator Valves with Confidence.

No. 432 Steam Radiator Valve. Corner Pattern.

No. 202 Hot Water Radiator Valve.

Your Jobber Can Supply You

Commonwealth Brass Corporation
DETROIT

COMMONWEALTH LAVIGNE *Radiator Valves*

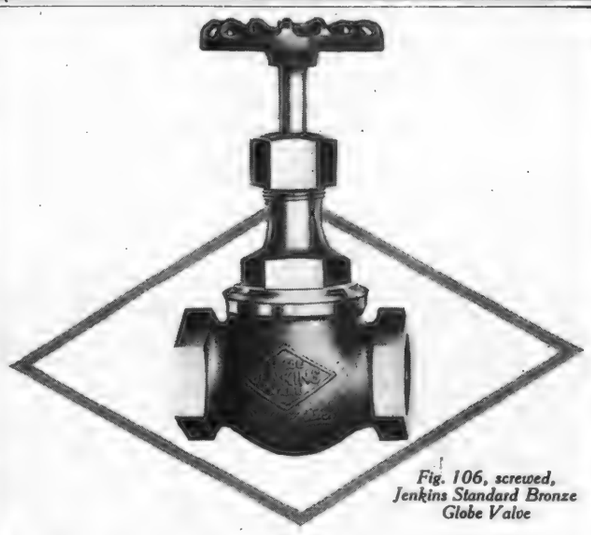


Fig. 106, screwed, Jenkins Standard Bronze Globe Valve

A Builder of Good-Will

Fig. 108, screwed, Jenkins Standard Bronze Angle Valve

An installation of Jenkins Valves is a builder of good-will for the heating contractor. It is a guarantee of the kind of valve service that keeps the owner sold on the firm that has done the work.

Jenkins Valves resist the pipe strains so common to heating service. They are made with the reserve strength to meet such stresses.

Fig. 168, Jenkins Bronze Radiator Angle Valve with male union

There are genuine Jenkins for practically every valve requirement. Make sure your men see the Jenkins "Diamond" mark.

JENKINS BROS.

80 White Street....New York, N. Y.
524 Atlantic Avenue..Boston, Mass.
133 No. Seventh St., Philadelphia, Pa.
646 Washington Blvd. ..Chicago, Ill.

JENKINS BROS. LIMITED
Montreal, Canada London, England

Always marked with the "Diamond"
Jenkins Valves
SINCE 1864

If you want your building "sealed" against drafts, dust and noise—install

Athey (*Patented*)

Cloth-Lined Metal Weatherstrip

—the ONLY *cloth-lined metal weatherstrip made*

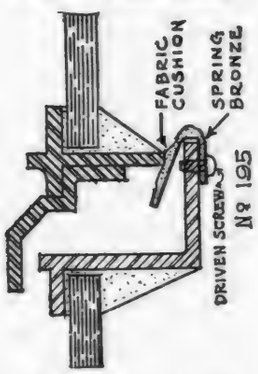
For Wood Sash

Athey Cloth-Lined Metal Weatherstrip for wood sash. The cloth-to-metal contact provides a perfect "seal" against drafts and dust, yet is sufficiently pliable so that the windows never stick.

The usual type of weatherstrip which consists of a metal rib running in a metal groove ***can't be*** completely efficient. Because, if the contact is tight enough to keep out drafts and dust, too much friction is created, and the sash will stick—sometimes to the point where the windows must be pried open.

In the Athey Weatherstrip the metal tongue or rib is fitted into a metal channel which is lined with cloth. This makes a perfect contact—***actually sealing the windows against drafts, dust and noise***—yet permits opening and closing the windows easily, as the cloth contact is sufficiently pliable to take care of any swelling of the sash. ***It provides a real solution of the weatherstripping problem.***

For Metal Sash



Athey Cloth-Lined Metal Weatherstrip for drawn steel windows. Notice the perfect but pliable contact of cloth and spring bronze. This strip is recommended by leading makers of steel sash as the one best weatherstrip for use with their products.

For Wood or Metal Sash

Athey Cloth-Lined Metal Weatherstrip is made for sash of any kind—wood or metal, either drawn steel or hollow. The same principle of a tight but resilient cloth-to-metal contact being used.

Athey Products

SEE OUR CATALOGUE IN SWEETS

Perennial Window Shades Disappearing Partition
Skylight Shades Cloth-Lined Metal Weatherstrips

Athey Company

6097 West 65th Street - Chicago, Illinois

In Canada: CRESSWELL-McINTOSH, Reg'd
270 Seigneurs St., Montreal, Que.

"I'm glad to see you, Mr. Johnson"

Mr. Johnson is welcome because he is not merely another handshaker. He has always real news and definite ideas to contribute, and he brings to a conversation a fair-minded attitude and a keen intelligence.

He has a first-hand knowledge of the fields in which you are interested, and of their latest developments. He seems to be able to see things from your side of the fence, too, and often offers many a workable suggestion.

Many men who welcome such a caller are neglecting interviews of even greater helpfulness—interviews with many Johnsons instead of one. Can you afford to miss "regular appointments" with the A.B.P. paper or papers that cover your business?

Set aside—now—a definite time to go through your business papers carefully. You will find that it pays to set a time to go through every issue.

The membership of a publication in the Associated Business Papers, Inc. means that it conforms to the highest standards of editorial and advertising practice.

The editorial matter, written by experienced men who know your field and its needs, is measured by the standard: "Is it real news?" The paper is pledged, as all A.B.P. members are, to consider first the interests of the subscriber.

Readers can depend upon the character of advertising in an A.B.P. publication, and they cannot afford to neglect the advertising pages. Here, too, are many practical suggestions.

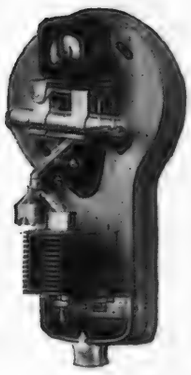
THE ASSOCIATED BUSINESS PAPERS, Inc.
Executive Offices: 220 West 42nd St., New York, N.Y.

A.B.P.

An Association of none but qualified publications reaching 56 fields of trade and industry.

The advertisers in this publication demonstrate by their presence here that they are awake to modern methods of selling as well as production—methods that cut costs and standardize operations.

A Mercoid-controlled Unit Heater is automatic



Many manufacturers of Unit Heaters have approved Mercoid Control. Here is a partial list:

American Blower Co., Detroit
Autovent Fan & Blower Co., Chicago
Buffalo Forge Co., Buffalo
Dwyer Equipment Co., Chicago
Ilg Electric Ventilating Co., Chicago
Modine Mfg. Co., Racine
New York Blower Co., Chicago
Pecco, Inc., St. Louis
Skinner Brothers Mfg. Co., St. Louis
B. F. Sturtevant Co., Boston
York Heating & Vent. Co., Phila.
L. J. Wing Mfg. Co., New York

Mercoid Controls have a wide adaptation for control of temperature, pressure and vacuum. They are now being used for oil burners, unit heaters, blowers, refrigeration and a host of other industrial appliances.

WHEN the temperature rises above the desired degree, the fan stops, starting again automatically when the temperature falls.

The even temperature which results is ideal for workers, but it is not the only benefit. There is a distinct saving of fuel and current, the owner is relieved from the bother of starting and stopping the fan by hand, and the worker's efficiency is assured by the even warmth.

Write for Mercoid Bulletin No. 845, mentioning the type of heater you are using.

The illustration to left shows a Mercoid Thermostat No. 845 with cover removed.

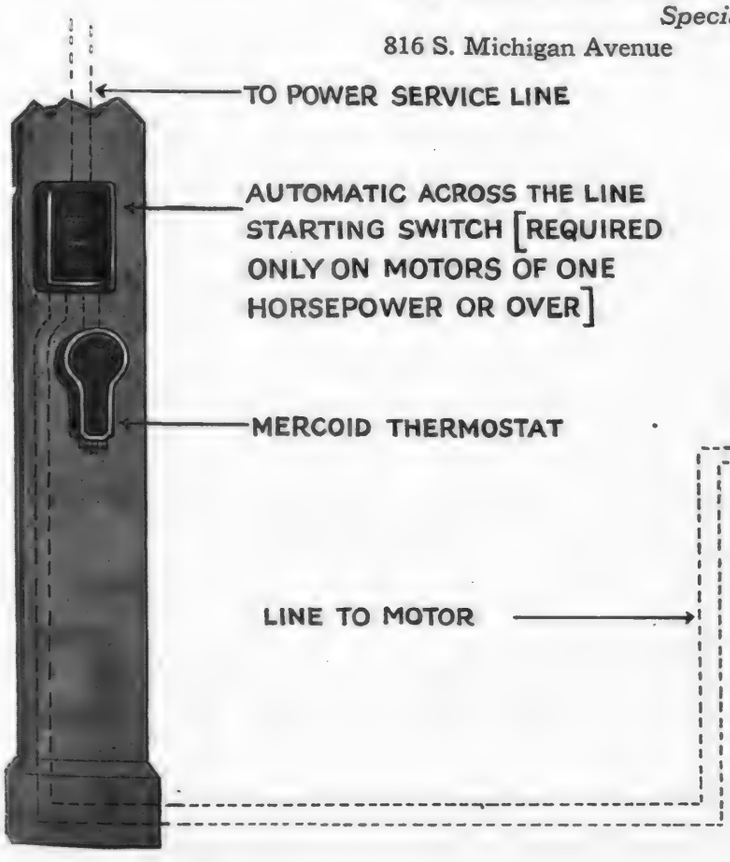
Mercoid Thermostats are regularly furnished with an adjustable range of 56° to 80°. Higher or lower temperatures can be supplied. Contacts are enclosed. No open arc. No corrosion.

The installation diagrammed below is used with motors of one horsepower or over. For motors of less than one horsepower, a starting switch is not required. Mercoid Thermostats will carry line current, either D.C. or A.C., 25-60 cycle, 110 or 220 volts.

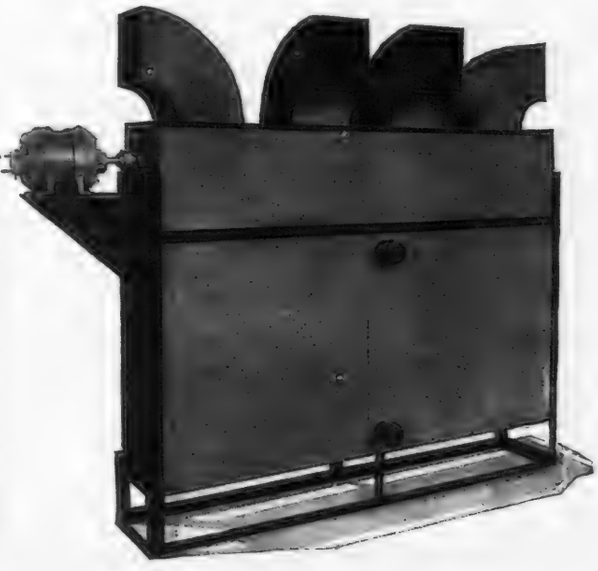
AMERICAN RADIATOR COMPANY

Specialties Department

816 S. Michigan Avenue Chicago, Ill.


TO POWER SERVICE LINE
AUTOMATIC ACROSS THE LINE STARTING SWITCH [REQUIRED ONLY ON MOTORS OF ONE HORSEPOWER OR OVER]
MERCOID THERMOSTAT
LINE TO MOTOR

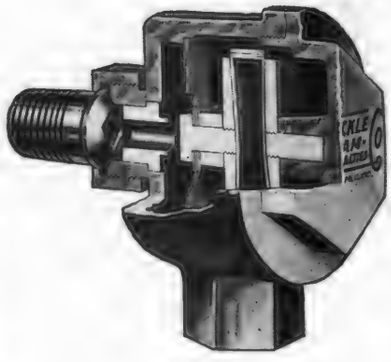
This diagram illustrates the method of hooking up the Mercoid Control with one type of Unit Heater.



STICKLE RADIATOR TRAPS

Installations ten and twelve years old. Still in satisfactory service in large establishments are to the credit of the trap to the left.

Are you getting tired of changing traps on the same job every few years? We solicit your inquiries on the Stickle (Patented) Bucket Type Radiator Trap. All sizes from ½" to 2" inlets and outlets.



Look at the Stickle Thermostatic Radiator Trap. Don't you think it has some good points, with the loose diaphragm, flat leaf spring, and position of valve and seat? See how the diaphragm is protected. It is patented. Yet you will be surprised at the low price, but not unless you will let us get in touch with you. Drop us a line now.

STICKLE STEAM SPECIALTIES CO.

NEW YORK **Indianapolis, Ind.** BOSTON

No. 7—Have you checked your valve requirements with the

SCOTT LIST—?

Scott Bronze Check Valves

No. 82	—S.E.	Regrinding Swing Check	125 lbs. S.W.P.
No. 86	—S.E.	Noiseless Cushion Check	125 lbs. S.W.P.
No. 87	—S.E.	Rouse Swing Check	125 lbs. S.W.P.
No. 90	—S.E.	Rouse Angle Ch. with Un	125 lbs. S.W.P.
No. 194	—S.E.	Std. Horizontal Check	125 lbs. S.W.P.
No. 195	—S.E.	Std. Vertical Check	125 lbs. S.W.P.
No. 206	—S.E.	U.B. Regrinding Check	200 lbs. S.W.P.
No. 86-E	—S.E.	Flower Cushion Check	250 lbs. S.W.P.
No. 253	—S.E.	U.B. Regrinding Check	250 lbs. S.W.P.
No. 353	—S.E.	Regrinding Check	350 lbs. S.W.P.

Scott Iron Body Check Valves

No. 83	—S.E.	Regrinding Swing Check	125 lbs. S.W.P.
No. 84	—F.E.	Regrinding Swing Check	125 lbs. S.W.P.
No. 88	—S.E.	Rouse Swing Check	125 lbs. S.W.P.
No. 89	—F.E.	Rouse Swing Check	125 lbs. S.W.P.
No. 59	—S.E.	Regrinding Swing Check	250 lbs. S.W.P.
No. 60	—F.E.	Regrinding Swing Check	250 lbs. S.W.P.
No. 198	—S.E.	Flower Cushion Check	250 lbs. S.W.P.
No. 199	—F.E.	Flower Cushion Check	250 lbs. S.W.P.

S.E. Screwed Ends S.W.P.—Steam Working Pressure
F.E.—Flanged Ends O.S.&Y.—Outside Screw & Yoke

No. 90 "Rouse" Angle Bronze Swing Check

No. 87 "Rouse" Bronze Swing Check

No. 194 Std. Bronze Horizontal Check

No. 82 Regrinding Bronze Swing Check

No. 253 Extra Heavy Union Bonnet Regrinding Check

No. 353 Extra Heavy Bronze Swing Regrinding Check

SCOTT VALVE MANUFACTURING COMPANY

DETROIT - - - MICHIGAN

Manufacturers of the **SCOTT** SINCE 1886 Complete Line of **VALVES**

SIGN OF VALUE

"MAXIMUM SERVICE PER DOLLAR"

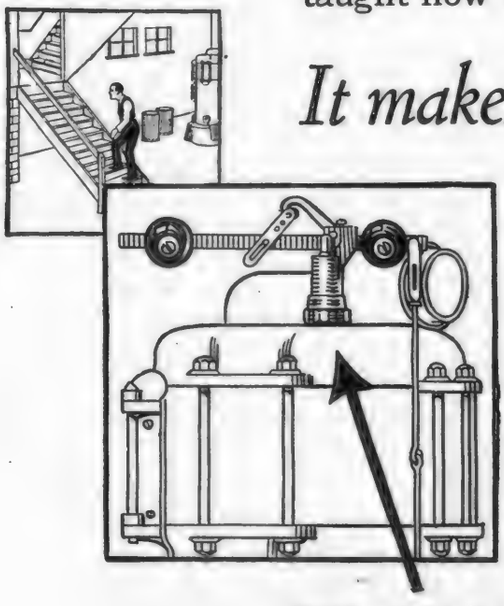
"What good does it do me to install ARCO Water Regulators?"

Here is the answer given by hundreds of heating contractors

There are hundreds of heating contractors who include an Arco Water Regulator on every single hot water job they install. They find it increases their business and their profits.

It puts money in the bank!

On every hot water heating job there is extra profit on the Arco Water Regulator and besides, there is money saved because complaining owners do not have to be taught how to operate the dampers by hand.



It makes salesmen of many owners

The owner for whom you install an Arco Water Regulator becomes a booster for you. He gives you the credit for making his job handle so easily.

Naturally, he tells his friends. And a reputation built up by satisfied customers is the quickest road to increased business and prosperity.

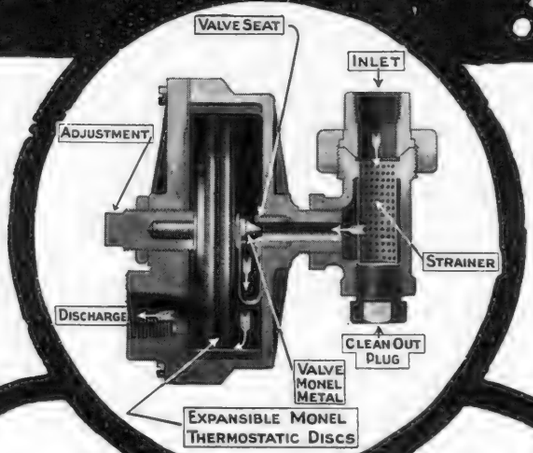
***THE ARCO WATER REGULATOR** is one of many heating accessories made and guaranteed by*

AMERICAN RADIATOR COMPANY

SPECIALTIES DEPARTMENT

816 So. Michigan Avenue Chicago, Ill.

A High Pressure Thermostatic Steam Trap *that l-a-s-t-s!*



1. Thermostatic discs guaranteed not to collapse or cave in.
2. Valve will not "wire-draw." Disc action is positive so that valve is *wide* open or shut *tight.*
3. Fits the palm of your hand and weighs only five pounds.
4. Needs no bracket or support.
5. BIG CAPACITY—½-inch size capacity is 1500 lbs. per hr. of condensate at 100 lbs. pressure, which is equal to many ¾-inch and some 1-inch traps.

Write for Bulletin

Because our ½-inch trap has as large a capacity as many ¾-inch and some 1-inch traps, this trap saves money right from the start and the upkeep is less than for many other traps. Let us send you a bulletin which fully describes this wonderful little trap and gives the details of our 90 days' free test offer.

THE POWERS REGULATOR CO.

35 years of specialization in temperature control

2718 Greenview Avenue, Chicago

NEW YORK BOSTON TORONTO

And 31 Other Offices. See Your Telephone Directory.

The Powers Regulator Co.,
2718 Greenview Ave., Chicago.

Gentlemen:

I shall be glad to receive your bulletin giving full description of your steam trap that l-a-s-t-s, and also the particulars of your 90 days' free test offer.

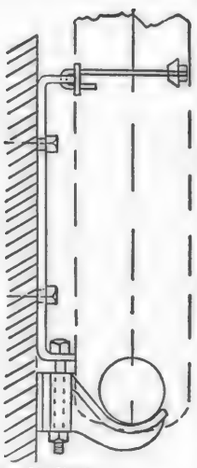
Name .....

Firm .....

Address .....

(3350)

THE GLEOCKLE
Wrought Iron
Adjustable
RADIATOR BRACKET



Patented
No. 9 Bracket for Legless Column Radiation

Convenient—Safe—Durable

Used in buildings where the best equipment is specified, and besides being convenient, safe and durable they are easily erected, adjustable, inexpensive, sanitary, and invisible after erection.

FIT ANY MAKE OF WALL RADIATOR

Send for descriptive booklet and trade discount

A. F. GLEOCKLE, Jr.

415 Bay Street, Rochester, N. Y.

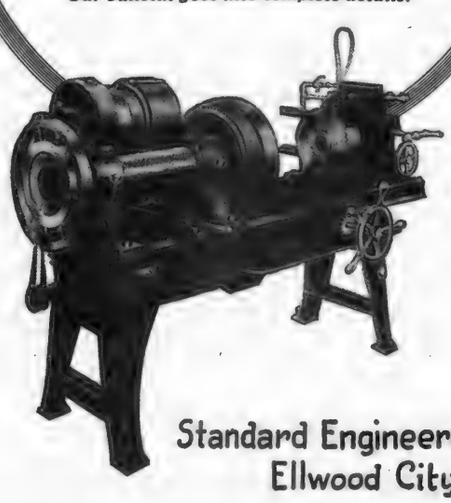
STANDARD WIELAND

PIPE THREADER AND CUTTER

Deeper and sharper threads, more cleanly cut than is possible with an ordinary pipe threader—are assured with the Standard Wieland.

Its ruggedness and simplicity—its ability to "deliver the goods" under the most severe conditions—are features of the Standard Wieland that you can't afford to overlook.

Our bulletin goes into complete details.

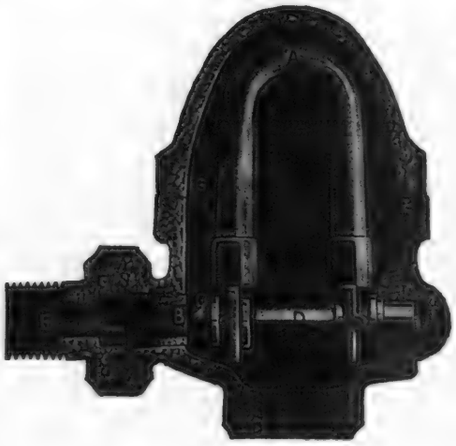


Standard Engineering Co.
Ellwood City, Pa.

Here is the second advertisement in the new "Early 80's" Series on the Minneapolis Heat Regulator, which is attracting widespread interest and comment. A full page in the *Saturday Evening Post, House Beautiful* and *House & Garden.* A two-thirds page in the *American Magazine.*

This one advertisement will reach nearly 5 million families or over 20 million people.

Saturday Evening Post Sept. 11th
House & Garden Sept.
House Beautiful Sept.
American Magazine Nov.
Who Expected to Breakfast in Comfort in the Early 80's?
IN the early eighties there was some excuse for a cold house in the morning. Manual regulation of the heating plant was a necessity those days. But in the middle eighties standards of heating changed with the invention of the Minneapolis Heat Regulator. Today the highly developed Minneapolis not only keeps the temperature uniform but provides other important advantages through clock control.
The Minneapolis clock starts your day with a smile. Out of bed—into a room of cozy warmth, no chills up and down your back. The first morning it's a revelation. You step into the living room, look at the thermometer on the thermostat and behold—it's 70 degrees on a sub-zero morning. Yet you never touched the fire. The clock raised the thermostat indicator, opening the drafts for you.
All day long the temperature never varies. At night, retiring time, the clock automatically lowers the thermostat indicator, checking the fire for comfortable sleeping. Saves fuel.
The new Minneapolis "77" 8-day clock thermostat is a distinct achievement. The jeweled clock is remarkably simple and dependably accurate. Built complete by Minneapolis craftsmen.
Choose the Minneapolis for your heating system, whether it burns coal, oil or gas. The leading oil burner manufacturers have adopted the Minneapolis as standard equipment. Write us for their names, judge for yourself. Mail coupon for full information.
The Minneapolis Heat Regulator is sold and installed by a nation-wide organization with branch offices in principal cities and experienced dealers in almost every community. Branch and distributing offices: New York, Chicago, Philadelphia, Milwaukee, Detroit, Cleveland, St. Louis, Cincinnati, Boston, Pittsburgh, Baltimore, Washington, D.C., Buffalo, Syracuse, St. Paul, Kansas City, Omaha, Denver, Portland, Oregon, Seattle and Hartford, Connecticut.
MINNEAPOLIS HEAT REGULATOR CO.
Name
Address
City
State
The "MINNEAPOLIS" HEAT REGULATOR
for COAL—GAS—OIL



The Perfect Automatic Valve for Vacuum or Vapor Heating

"VENTO" Advantages

System starts with valve wide open, assuring circulation almost the instant steam is turned on.

Control of valve opening from two to eight times larger than other makes of valves.

Size of valve opening reduces danger of fouling with scale or other foreign matter.

Closes absolutely tight against steam. No necessity for use of spray water at pump.

Cannot stick or gum from foreign matter, and operation is absolutely noiseless.

The "Vento" Automatic Valve represents a steady improvement in the Haines line of steam traps and offers the highest degree of steam trap efficiency.

There has been no change in the old reliable principle that has placed Haines Automatic Valve in a class by itself. The operating power is identical—the only difference being in the general construction.

Special features are: Horizontal mounting of valve mechanism—long range of movement—positive action—quick opening and closing.

Send for booklet

WILLIAM S. HAINES & CO.

12th & Buttonwood Streets

PHILADELPHIA, - - PA.

VENTO

"Keeping Others In Hot Water"—

for

Hotels, apartment buildings, hospitals, Y. M. C. A. buildings, schools and laundries

Special Attention Given to Installations Requiring Large Quantities of Hot Water, with Live or Exhaust Steam as the Heating Medium.

—may be a pastime for some folks, but for the Sims Company it is a serious proposition—a matter requiring a thorough knowledge of hot water requirements.

A long study of these requirements enables us to offer heaters that assure constant and efficient hot water service.

Engineers feel safe in specifying "SIMS" because they know it means **reliability**—a service you want to render your client.

SIMS CLEAN E-Z STEAM TUBE STORAGE HEATER

Our Engineers will gladly confer with you, without obligation, on your hot water problems.

THE SIMS CO.

Erie, Pa.

A good place to live, to work and to play.

Honeywell Type "A" *Masterstat,* Accepted and Listed as Standard by *Underwriters' Laboratories, Inc.,* June 23, 1926.

Underwriter's Laboratories Inc.

Reports on

THE MASTERSTAT

Honeywell's Latest Automatic Oil Burner Control and Shut-off

"This device is positive in operation, sensitive in response to changes in temperature or steam pressure, and reduces to a minimum the possibility of firing into a dry boiler, or of creating excessive pressures or temperatures in the boiler to be controlled." —Excerpt from Report of Underwriters' Laboratories, Inc., dated May 18, 1926.

The Honeywell Type "A" *Masterstat,* a limiting device and a master safety control in one unit, has conclusively demonstrated its possession of the following very definite attributes:

Affords positive safety against firing dry boilers; limits steam pressure on steam installations; permits vacuum range on vapor installations; limits water temperature on hot water installations; limits casing temperature on warm air installations; has no floating period; has positive protection against its own possible failure.

The failure of the burner to shut off for any reason will cause the *Masterstat* to function and open the burner motor circuit before the dangerous temperature point has been reached.

Any range of temperature or pressure can be had by the setting of the moveable hands. By limiting the heater temperature or pressure, economy in fuel consumption is effected.

The report of Underwriters' Laboratories, Inc., accepting and listing the *Masterstat* as standard, with the specific commendation quoted above, confirms, with a certain finality, *Honeywell's* claims as to the control and safety features of this mechanism.

The Honeywell Heating Specialties Co.,
Wabash, Ind.

HONEYWELL

Temperature Regulators

You Can Forget This Trap When Once Installed

Because:

Thermostatic discs in the Powers High Pressure Steam Trap l-a-s-t. They are guaranteed not to collapse or cave in.
(For pressures from 5 to 125 pounds. Made in two sizes only: ⅜-inch and ½-inch.)

Monel valve will not wire draw because disc action is so positive that valve is *wide* open or shut *tight*. ½" size needs no brackets or supports —fits in the palm of your hand and weighs only five pounds.

Big Capacity. Because our ½-inch trap has a capacity as large as many ¾-inch and some 1-inch traps, it saves money right from the start, and the upkeep is less than for other traps. Let us send you a bulletin which fully describes this wonderful little trap and gives the details of our 90 days' free test offer.

THE POWERS REGULATOR CO.
35 years of specialization in temperature control

2718 Greenview Ave., Chicago.
Also New York, Boston, Toronto and 31 other offices. See your telephone directory.

The Powers Regulator Co.,
2718 Greenview Ave., Chicago.

Gentlemen: I shall be glad to receive your bulletin giving full description of your steam trap that l-a-s-t-s, and also the particulars of your 90 days' free test offer.

Name .....

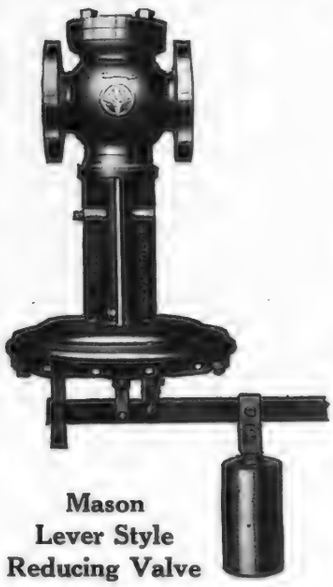
Firm .....

Address .....

(3453)

Keep Steam Pressure in Heating Systems Right

—Specify Masons



Mason Lever Style Reducing Valve

The Mason No. 236 is made for reduced pressure from 0 to 10 pounds and from 5 to 25 pounds.

Heating Engineers are learning that the simplest way to make sure of accurate control of the steam in heating systems is to use a Mason Lever Style Reducing Valve.

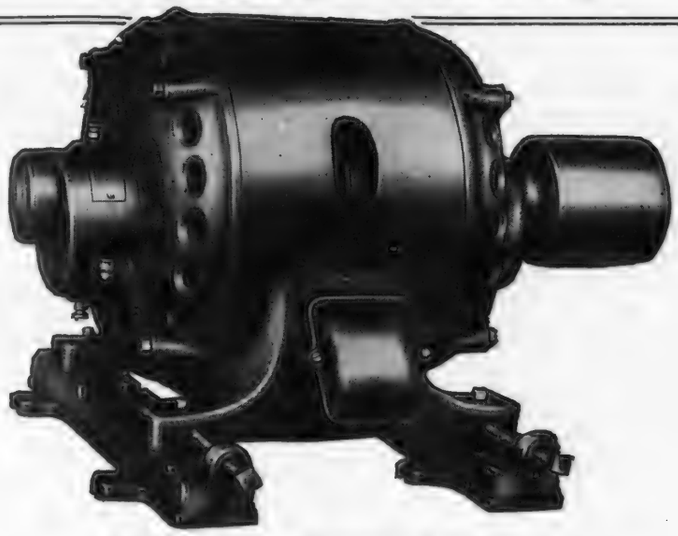
The same Mason excellence of design that has made for the efficiency and low service cost of other Mason Regulators is found in this Mason Reducing Valve with its weighted lever suspended on hardened steel knife edges.

Let us send you Catalog 62 with complete information.

Mason Regulators
MASON REGULATOR CO.
Boston, Mass.

172

"They Keep a-Running"



2 Horse Power Century Squirrel-cage Induction Polyphase Motor

For Coal Stokers

Coal stokers require a motor that will stand rough use. That is why Century Squirrel-cage Induction Polyphase Motors are extensively used on this type of equipment, as well as other apparatus of a similar nature. These motors "Keep a-Running" because:—

(1) Lateral openings in bearing housings are equipped with tight-fitting brass dust collars and dust caps which exclude dust and dirt from the oil wells.

(2) Bearings are of phosphor bronze—the highest grade bearing material obtainable —cast from metal heated in electric furnaces in the Century plant.

(3) Bearings are substantially proportioned—large enough to withstand the pound of gear drive—accurately machined on all dimensions and provided with machine-cut figure-8 oil grooves.

(4) Armatures are practically indestructible. Heavy conductor bars are brazed into the channel-section end ring slots over an area equal to about six times the cross-sectional area of the bars.

(5) Thorough ventilation is assured by sheet steel fans at the ends of the armature and —in the larger size motors—by the addition of grid ventilators forming part of the armature structure.

All constructional features responsible for the "Keep a-Running" reputation of Century Squirrel-cage Induction Polyphase Motors are fully described in Bulletin No. 38. Send for it today.

Century Squirrel-cage Induction Polyphase Motors are built in all standard sizes from 1/4 to 50 horse power. Temperature rise not more than 40° Centigrade.

CENTURY ELECTRIC COMPANY

1806 Pine St. St. Louis, Mo.

For More Than 23 Years at St. Louis

1/4 to 50 H. P. Century MOTORS 1/4 to 50 H. P.

Installations of Mouat System of Heating Steadily Increased

City Building, Logansport, Ind.

Another Building in Indiana Mouat Equipped

The efficiency of the Mouat System of Heating continues to attract considerable attention throughout the heating industry. The reaction to this is a steadily increasing demand on the part of the heating engineer in collaboration with architect and owner that Mouat System be installed.

One of the latest Mouat installations is that in the City Building at Logansport, Indiana.

The Mouat System is a two-pipe gravity vapor or atmospheric steam heating system, maintaining a pressure of 1 to 3 ounces. Rapid changes or extremes in temperature do not affect its efficiency. It is flexible and meets all demands in all types of buildings.

Let us send full information

VAPOR MOUAT HEAT

MOUAT VAPOR HEATING COMPANY
CLEVELAND, OHIO

VAPOR MOUAT HEAT

The Wainwright Improved Expansion Joint

Suitable for Pipe Movement of 1½ to 2 inches

Wainwright Improved Expansion Joint

THESE fittings are of the packless type—no stuffing box to be continually adjusted—no packing to blow out, deteriorate and require frequent replacement. The multiple corrugated copper expansion tube of uniform thickness and strength absorbs the movement.

Outside AND INSIDE expansion equalizing rings assure equal distribution of movement among the several corrugations.

The joint is protected from erosion and abrasive wear by the inner hard brass or copper sleeve which also affords smooth passage with least friction loss to steam, water, or gas being handled.

We will appreciate the opportunity of discussing special problems. Bulletin V-46, containing sizes, rating tables and layouts for typical installations, as well as information on Wainwright Anchors and Guides, will be sent on request.

WHEELER CONDENSER & ENGINEERING CO.

149 Broadway, New York

Works - CARTERET, N.J., NEWBURGH, N.Y.

3

Fire Underwriters Building, John and Gold Streets, New York City. Architects, Clinton & Russell. Installation made by W. G. Cornell Company, New York City.

Arco Packless Valves for steam, water or vapor, are made in angle, corner and globe patterns. Name on dial, if desired.

In the home of perfect specifications—

ARCO Packless Valves

"Passed by the National Board of Fire Underwriters" has always been a mark of quality.

Naturally, the Fire Underwriters were most particular in the selection of every piece of material that went into their building. So, of course, when it came to the specification of radiator valves, Arco Packless Valves were selected for every one of the 984 radiators. And they brought these four advantages:

1 Arco Packless Valves are good looking. They add a finishing touch of smartness to a radiator.

2 They pay for themselves by saving the annual expense of repacking.

3 They prevent leaks—one of which may cost more than all the valves in the building.

4 They add to the comfort of the owner or his tenants. Arco Packless Valves open with one smooth turn.

A heating plant deserves accessories that insure perfect performance. Every radiator deserves an Arco Packless Valve.

The ARCO PACKLESS VALVE is one of many heating accessories made and guaranteed by

AMERICAN RADIATOR COMPANY
SPECIALTIES DEPARTMENT
816 So. Michigan Avenue Chicago, Ill.

THE CONNECTICUT GENERAL LIFE INSURANCE COMPANY—HARTFORD, CONN.
James Gamble Rogers, Architect.
Consulting Engineers: Jaros & Baum; Werner Nygren.
Contractors: Heating, Baker Smith Co.; Plumbing, Otto Epstein, Inc.

The WHITLOCK COIL PIPE Co., 40 South St., Hartford, Conn.
New York, Boston, Philadelphia, Chicago, Baltimore, Detroit, San Francisco, and other principal cities. Consult telephone book.

Insuring Heat and Hot Water

Two Whitlock convertors insure the proper room temperature and two Whitlock storage heaters insure plenty of hot water in this new home of The Connecticut General Life Insurance Company.

A deserved reputation for dependability is continually gaining new policy-holders for the Connecticut General and new customers for Whitlock products.

Many architects and engineers who specify Whitlock Products see the foundation for this reputation in the superior engineering ability of Whitlock Engineers.

"Hot Water? - Let Whitlock Do It."

WHITLOCK HEAT TRANSFER PRODUCTS

CORRECTLY DESIGNED
Cast Iron Blow Off Basins
also
APPROVED GARAGE BASIN EQUIPMENT

INLAND IRON WORKS
99-111 McDonough Street JOLIET, ILL.

Do You Still Use Large Domestic Coal?

Why not economize by using Buckwheat Coal—at about half the price of Domestic Coal.

You can burn Buckwheat with PYRAMID GRATES

Let Us Send Full Details

PYRAMID IRON PRODUCTS CO.
136 Liberty Street New York City

Brownell Return Flue Portable Heating Boiler—Smokeless Type

BROWNELL

Better Boilers for Heating and Power Purposes
70TH YEAR

of successful manufacturing experience. This is the reason why Brownell Boilers are specified by all the leading Heating and Contracting Engineers.

BROWNELL Steel Heating Boilers are
LOW IN FIRST COST
HIGH IN EFFICIENCY
BUILT TO LAST A LIFETIME

Our reputation is your insurance of a high quality product. Let us solve your heating problems. Sales representatives in all principal cities. Send for them.

THE BROWNELL CO.
DAYTON, OHIO

THE BROWNELL COMPANY The World Over SINCE 1855 DAYTON, OHIO, U.S.A.

Established 1855

Send for Bulletins
B 6 B 6 A

BOILERS

You can now use VINCO at bigger savings than ever!

VINCO as now applied, is guaranteed to give perfect satisfaction when used in 20 to 40 per cent smaller quantity than formerly, the exact reduction in amount depending upon the size of the heating system.

This means a clean saving of 20 to 40 per cent on the cost of VINCO as the price per pound has not been increased.

All VINCO now in the hands of our dealer representatives and being sent out from our laboratories should be used in accordance with this revised schedule:

Sq. ft. of radiation	Boiler rating	Quantity of VINCO
300	500	3 lb.
500	825	5 "
1000	1575	8 "
1500	2300	13 "
2000	3100	15 "
3000	4500	20 "

With this quantity reduction, *the cost for the* VINCO *averages less than 1 cent per sq. ft. of radiation.*

VINCO treatment puts all internal surfaces into prime condition in 36 steaming hours, in comparison with ordinary blowing down under pressure to get oil, grease, scale, dirt, etc., out of a new or remodeled heating system.

Hardly an hour of the steam fitter's time is required and no additional labor expense is involved in this "breaking in" process. Therefore, VINCO treatment not only releases many steam-fitter hours for productive work, but also quickly gets the system ready for prompt and willing acceptance. It afterwards protects against priming, foaming, surging, poor heating effect, expansion and contraction cracks, and waste of fuel during the entire heating season.

Make VINCO treatment the finishing touch on every steam or vapor heating system you erect or overhaul, and you will enjoy the extra profits and the better relations with customers.

VINCO IS GUARANTEED ON A MONEY-BACK BASIS both as to its efficiency and its ability to bring about the desired improvement entirely without harm to any part of the heating system.

Patents are pending upon the product and method of application. The use of any unlawful imitation will be subject to prosecution. For safety and full benefits, specify by name and see that the material comes from 3-lb., 5-lb., or 10-lb. lithographed cans bearing our name and registered trade mark as shown. Buy from your jobber or, if necessary, direct from us. Mail the coupon.

THE VINCO COMPANY, INC., 75 Vesey St., New York.

Please advise where Vinco may be obtained and at what cost to clean out a heating system with..... sq. ft. of radiation.

Name.....

Address.....

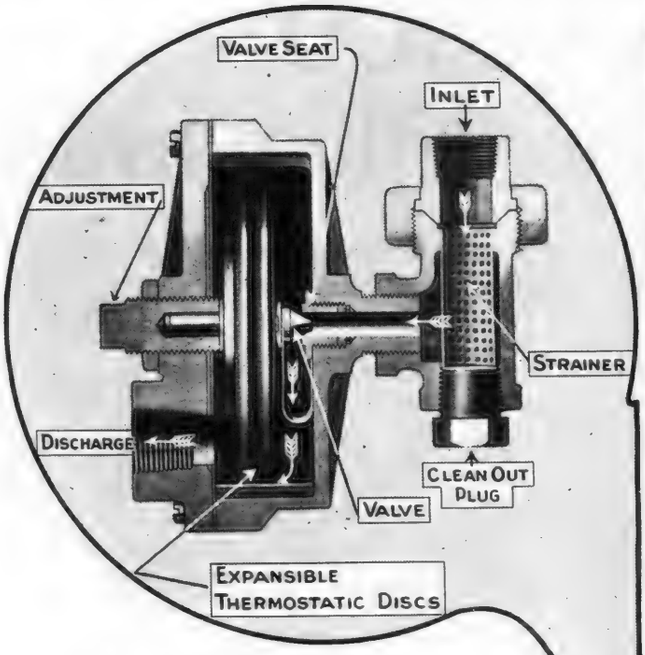
Name of Jobber.....

"I conquer" (Latin)

VINCO

***conquers* foaming, surging, priming**

***by removing* oil, grease, rust, scale and dirt**



The Long-life Steam Trap

"Most engineers will not believe me when I tell them that the Thermostatic element in our High Pressure Steam Trap is good for years of service."

So said one of our salesmen recently, when telling the rest of the "gang" why he sold so many traps in his territory.

"The real objection," he went on, "that every engineer has to a thermostatic trap is that the thermostatic element gives out.

"Our thermostatic diaphragms (there are two of them) are made of monel metal. Action of either diaphragm is equal to the one in any other trap. It *acts quickly* and *closes tight*, preventing wire drawing and waste of steam.

"Add to that the facts that the trap is so small that it requires no bracket to support it and that our ½" size will discharge as much condensation as many ¾" traps, and we have an argument that appeals to any thinking engineer."

Powers' High Pressure Steam Trap.

Write for bulletin describing this wonderful little steam trap.

THE POWERS REGULATOR CO.

35 years of specialization in temperature control

2718 Greenview Ave., CHICAGO

NEW YORK BOSTON TORONTO

And 31 Other Offices. See Your Telephone Directory.

"More Information" Coupon

Gentlemen:

I shall be glad to have you send me facts about your Long-Life-Big-Capacity Steam Trap; also particulars of your free test offer—without obligation on my part.

Name.....

Firm.....

Address.....

(3452)

NATIONAL Storage U BEND TYPE Heater

First cost saves expensive removal job

He insisted on a National Storage Heater with cast iron shell, for once installed he knew it would keep on going as long as the building lasted. He could not afford to use a steel shell heater, for removal when worn out meant cutting through thick walls and pavement, also interrupting traffic on a busy street.

There is no wear out to a National Cast Iron Shell Heater. Every dollar invested in it will be returned many times over in extra long and satisfactory service. There is *no corrosion, no rusty water, no leaky joints, no replacement.*

Be sure that you specify the National Storage Heater with cast iron shell for your new building.

A National engineer will call at your request. Send for Bulletin 65.

National Heaters are giving lifetime service in Hospitals, Hotels, Clubs, Colleges, Municipal and Office Buildings, Y. M. C. A.'s and Apartment Houses.

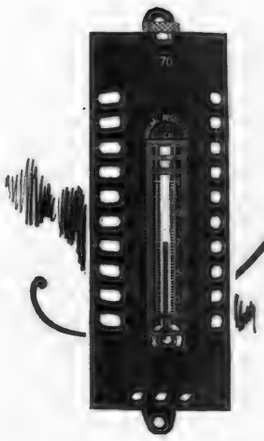
The National Pipe Bending Co.

Established 1883

120 River St., New Haven, Conn.

Boston New York Philadelphia

The Standard of the Trade



National Regulation

Investigate!

ANY one of many thousands of National installations will prove to you not only the merits of temperature control but the Superiority of National Regulation.

Any one or all of these installations are open to your investigation. The names and data are yours for the asking. The more thorough the investigation the surer your decision to specify

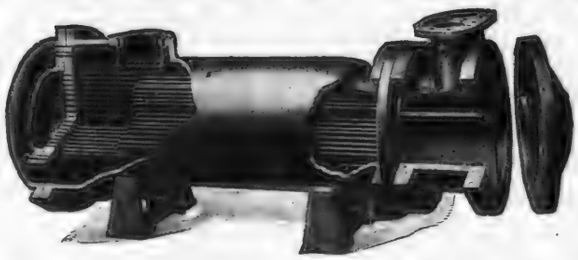
THE NATIONAL SYSTEM
AUTOMATIC TEMPERATURE CONTROL

In a "Personal Service" letter to Architects and Engineers we give detailed information on the relative efficiency and economy of Positive Action and Graduated Action Systems of Temperature Regulation. This letter is sent only upon request—on your business letterhead.

NATIONAL REGULATOR CO.
2301 KNOX AVENUE CHICAGO

Hot Water *Instantly*

Any quantity, any temperature



For Hotels, Apartments, Laundries, etc.

G-R Instantaneous Heater

for any given pressure drop, has a higher rate of heat transfer than any other closed water heater on the market.

Overload capacities possible with only slight reduction in final water temperature.

Minimum external dimensions for any desired rating.

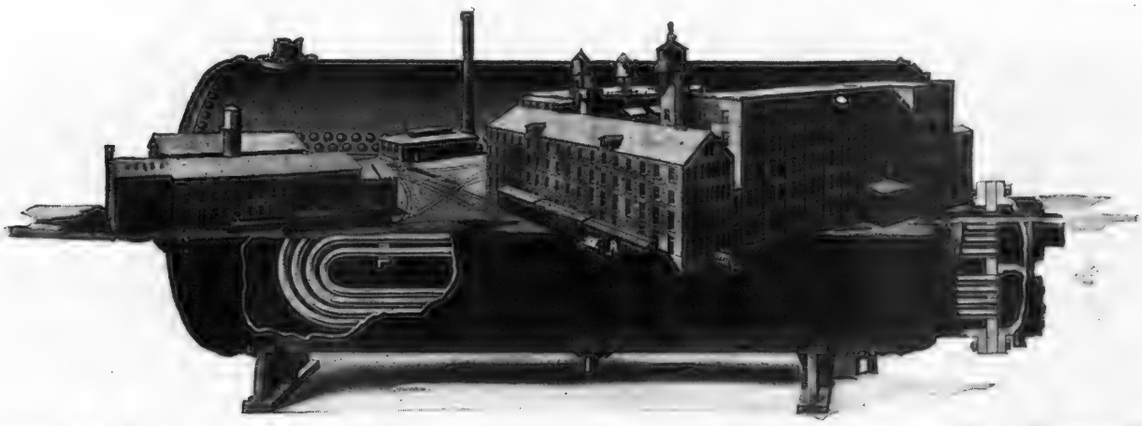
The Griscom-Russell Co.
Dept. H, 285 Madison Ave., New York

Send the coupon for full information

Philadelphia	Chicago	St. Louis	San Francisco
Boston	Detroit	New Orleans	Los Angeles
Rochester	Cleveland	Dallas	Seattle
Pittsburgh	Milwaukee	Houston	Salt Lake City
Columbus	Minneapolis	Atlanta	Tulsa
Indianapolis	Kansas City	Charlotte	Denver

For Canada: Riley Engineering and Supply Co., Ltd., Toronto

THE GRISCOM-RUSSELL CO., Dept. H, 285 Madison Ave., New York City.
Gentlemen:— Please forward immediately a free copy of your information leaflet on the G. R. Instantaneous Heater.
Name.....
Firm.....
Address.....
H&V 9-26



—and here too!

At the big plant of Curtice Bros. Co., Rochester, N. Y., hot water plays a most important part in turning out uniformly good BLUE LABEL Ketchup and other preserves. Here, Patterson Hot Water Heaters are delivering, year in and year out, all the *hot water required, as hot as required and as fast as required.*

You will find the really big firms in most every industry using Patterson Hot Water Heaters; Heinz, Ford, Borden, Remington, National Biscuit, Childs, National Cash Register, Swift, Eastman Kodak, General Electric, Standard Oil, U. S. Steel, Postum, U. S. Rubber and hundreds of others whose names and products are nationally known are users of Patterson Hot Water Heaters.

You can make no mistake when you specify the Patterson Hot Water Heater. Its workmanship is of the best and its performance is guaranteed by a 45-year old concern.

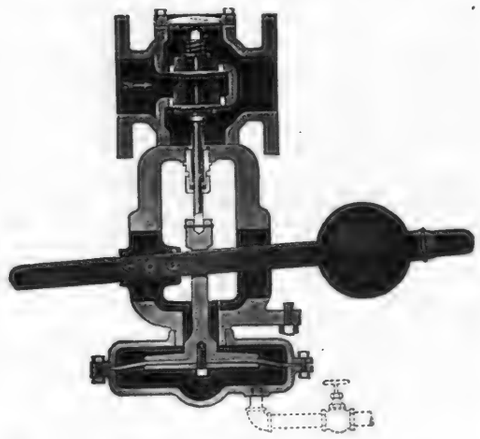
Write for catalog and further particulars

The Patterson-Kelley Co., 107 East 40th Street, New York

Patterson Hot Water Heaters

Quality KIELEY Simplicity

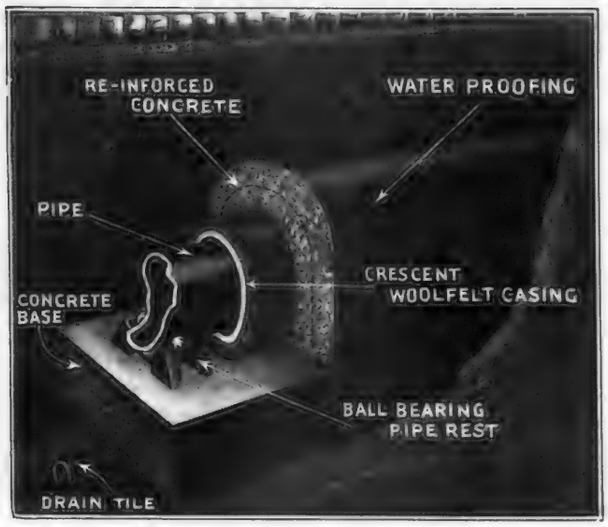
REGISTERED TRADE MARK



Engineers have specified Kieley Specialties for the Largest Buildings and Power Plants in the United States. Manufacturing Specialties for 47 years warrants that confidence.

KIELEY & MUELLER, Inc.

34 West 13th St., New York City



THE CRESCENT SYSTEM

Dirt-Proof Ball Bearings, and Air Space Around Pipe, Permits Rotation of the Pipe, Adding Years to its Life.

Manufacturers and Contractors of

UNDERGROUND STEAM DISTRIBUTING SYSTEMS
TUNNEL OR CONDUIT CONSTRUCTION

"We solicit your correspondence"

W. H. PEARCE & CO.
115 S. Dearborn Street
CHICAGO

Catalog on Request

ADSCO EXPANSION DEVICES are manufactured for every pressure and temperature, for steam, water, oil, air and gas lines. They are demanded for their adaptability to every service condition.

Engineers endorse their practical design and sturdiness.

Send for your copy of bulletin showing the many ADSCO Expansion Devices from which you can select the exact type of fitting you need.

AMERICAN DISTRICT STEAM COMPANY

GENERAL OFFICES AND WORKS

NORTH TONAWANDA, N.Y.

Offices:

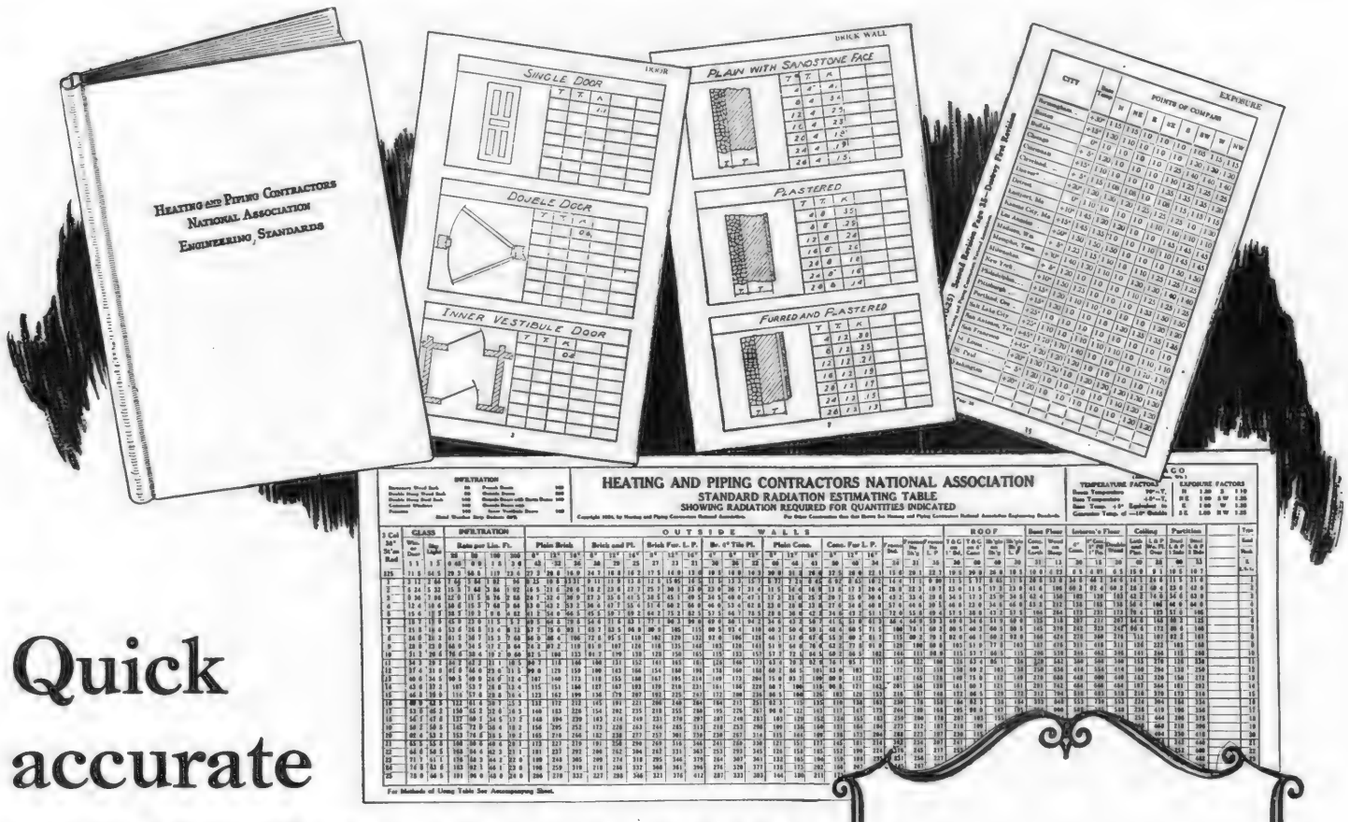
New York Chicago Seattle

AMERICAN DISTRICT STEAM COMPANY North Tonawanda, N. Y.

Without obligation send me copy of your Bulletin H on pipe expansion and ADSCO Expansion Devices.

Individual ..... Position .....

Company ..... Address .....



Quick accurate ESTIMATION of RADIATION

A simple fool-proof method is available for every heating contractor.

A wealth of information on radiation has been compiled by a group of America's foremost heating engineers. Over $100,000 has been spent in time and money by the Heating and Piping Contractors National Association so heating contractors may have a reliable guide, so time may be saved, so radiation may be **accurately** estimated. Contractors find this book worth many times its weight in gold. 151 constants are given for various types of construction and thickness of wall, infiltration factors, exposure factors, and other information needed to figure radiation quickly and correctly.

The complete work, in a loose leaf binder, entitled "Engineering Standards" may be obtained by readers of this magazine for $5.00. Standard Radiation Estimating Tables for any one of the twenty-four cities listed in the panel at the right is given with each book. Please signify the city desired. If your city is not listed, request chart for city nearest your locality.

Fill in the coupon and order today. A heavy demand necessitated a reprint of this book, which reprint is now available.

HEATING AND VENTILATING MAGAZINE,
1123 Broadway, New York, N. Y.

Date.....

Send me copy of "Engineering Standards" complete with all data necessary to correctly estimate radiation in any type of building. Also include Radiation Table for City of.....

.....

Enclosed find $5.00 to cover cost and postage.

Name.....

Address .....

City and State.....

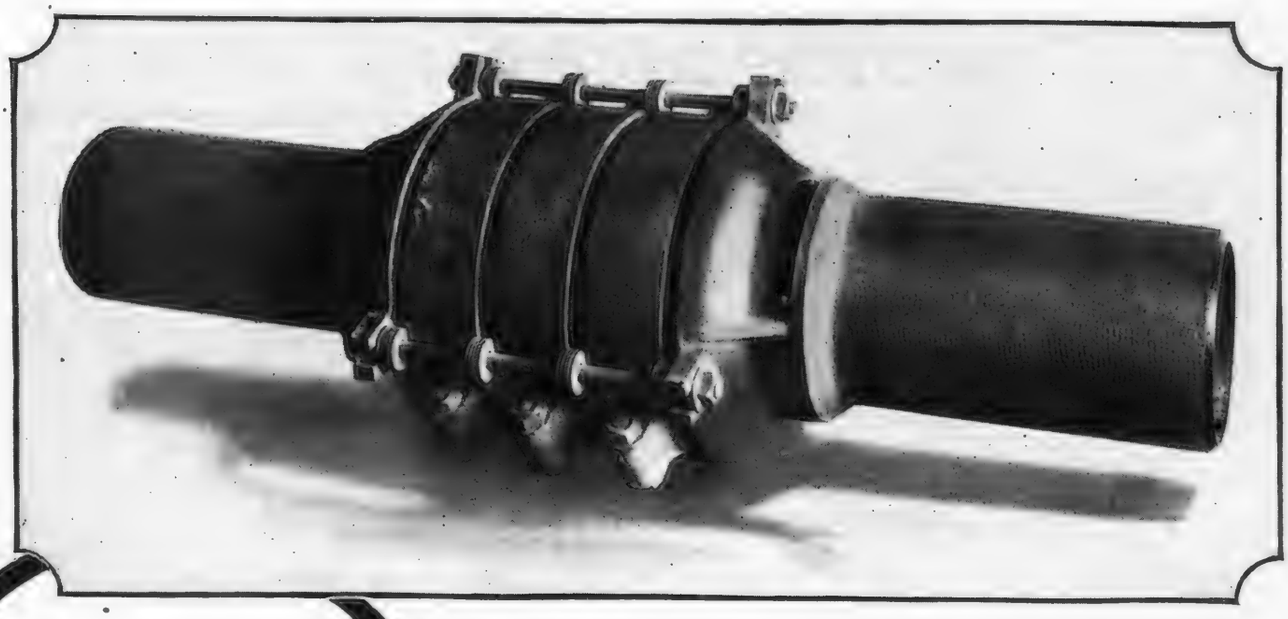
The Heating and Piping Contractors National Association

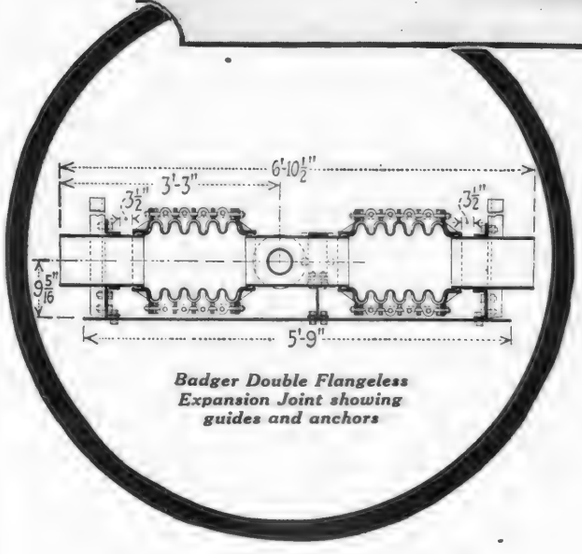
—1926 is the 37th year of this nation-wide organization of heating and piping contractors.

America's leaders in heating and piping work are numbered among its members.

Its book on radiation compiled by the Committee on Standardization is a notable example of the beneficial work carried on by the Heating and Piping Contractors National Association.

Birmingham, Ala.	Milwaukee, Wis.
Boston, Mass.	New York, N. Y.
Buffalo, N. Y.	Philadelphia, Pa.
Chicago, Ill.	Pttsburgh, Pa.
Cincinnati, Ohio	Portland, Ore.
Cleveland, Ohio	San Francisco, Cal.
Denver, Colo.	Salt Lake City, Utah
Detroit, Mich.	San Antonio, Texas
Eastport, Me.	St. Louis, Mo.
Kansas City, Mo.	St. Paul, Minn.
Los Angeles, Cal.	Washington, D. C.
Madison, Wis.	
Memphis, Tenn.	





Badger Double Flangeless Expansion Joint showing guides and anchors

Badger Engineering Service

Badger engineers are designers, manufacturers and installation experts for the following and kindred power plant products:

Spray Cooling Ponds
Cooling Towers
Pipe Bends
Air Washers
Dust Washers
Special apparatus for Cleaning Flue Gases
Chemical Apparatus
Copper and Sheet Metal Work

TRADE MARK

And now— Badger Expansion Joint Protection! for welded steam lines

BADGER Engineers have met the need of protection for welded steam and hot fluid lines. This is but another example of Badger leadership.

In this type Badger Expansion Joint, flanged connections are entirely eliminated and provision made for welding the joint in the line as easily as any pipe section.

Jointless and packless welded pipe lines with maximum compensation for expansion or contraction is an engineering advance in pipe line design which Badger construction makes possible.

And every well-known, time-tried feature of Badger design is retained. Deep corrugations fitted with self-equalizing rings which distribute expansion equally over the entire length; jointless, one-piece construction of uniform section and strength; maximum allowance for variation in pipe length with minimum strain applied over any one section. These are a few reasons which have won preference for Badger Expansion Joints by engineers everywhere.

Detailed data on sizes and allowable pressures will be sent on request.

E. B. BADGER & SONS CO.

75 Pitts Street, BOSTON, MASS.

New York: 101 Park Ave. **Toledo: Ohio Bldg.**
Tulsa, Okla.: Mid-Continent Bldg.
Representatives in all principal cities

ENGINEERS' SPECIFICATION INDEX

AIR COMPRESSORS.

Janette Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Powers Regulator Co., Chicago, Ill.

AIR CONDITIONING APPARATUS.

Air Conditioning & Engineering Co., St. Louis, Mo.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buckeye Blower Co., Columbus, O.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N.J.
Clarage Fan Co., Kalamazoo, Mich.
Drying Systems, Inc., Chicago, Ill.
Fleisher Co., Inc., W. L. New York.
Games Slayter, Lafayette, Ind.
Grinnell Company, Providence, R. I.
Ilg Electric Ventilating Co., Chicago, Ill.
Midwest Air Filters, Inc., New York.
New York Blower Co., Chicago, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.

AIR COOLING AND DRYING SYSTEMS.

Aerofin Corp., Newark, N. J.
Autovent Fan & Blower Co., Chicago, Ill.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Mfg. Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N.J.
Clarage Fan Co., Kalamazoo, Mich.
Cooling Tower Co., New York.
Drying Systems, Inc., Chicago, Ill.
Fleisher Co., Inc., W. L., New York
Ilg Electric Ventilating Co., Chicago, Ill.
Midwest Air Filters, Inc., New York.
New York Blower Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Spray Engineering Co., Boston, Mass.
Stickle Steam Specialties Co., Indianapolis, Ind.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

AIR ELIMINATORS.

Jas. P. Marsh & Co., Chicago, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Midwest Air Filters, Inc., New York.

AIR FILTERS.

Badger & Sons Co., E. B., Boston, Mass.
Cooling Tower Co., New York.
Drying Systems, Inc., Chicago, Ill.
Duro Air Filter Co., Chicago, Ill.
General Air Filters Corp., New York.
Midwest Air Filters, Inc., New York.
National Air Filter Co., Chicago, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Spray Engineering Co., Boston, Mass.

AIR SEPARATORS.

Griscom-Russell Co., New York.
Hoffman Specialty Co., New York.

AIR WASHERS.

American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Mfg. Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Cooling Tower Co., Inc., New York.
Fleisher Co., Inc., W. L. New York.
Ilg Electric Ventilating Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.

BLOWERS

Fan.

American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buckeye Blower Co., Columbus, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York.
Ilg Electric Ventilating Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

Pressure.

American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.

Rotary.

Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

Turbine.

Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.

BLOW OFF BASINS.

Cast Iron.

Inland Iron Works, Joliet, Ill.

BOILER CEMENT.

Johns-Manville, Inc., New York.

BOILER COMPOUNDS

Vinco Company, Inc., New York.

BOILERS.

Down-Draft.

American Radiator Co., Chicago, Ill.
Brownell Co., The, Dayton, O.
General Boilers Co., Waukegan, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Kewanee Boiler Co., Kewanee, Ill.
Molby Boiler Co., New York.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Co., New York.
Richmond Radiator Co., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works, Titusville, Pa.
Universal Smokeless Boiler Co., Ravenna, Ohio.

Gas Fired

American Gas Products Corp., New York.
Evenheat Mfg. Co., Chicago, Ill.
Ofeldt Gas Boiler Sales Corp, Chicago, Ill.

Heating.

American Radiator Co., Chicago, Ill.
Brownell Co., The, Dayton, O.
Burnham Boiler Corp., Irvington, N. Y.
Continental Heater Corp., Dunkirk, N. Y.
Efficient Heating Boiler Co., Chicago, Ill.
Evenheat Mfg. Co., Chicago, Ill.
Fitzgibbons Boiler Co., New York.
Frost Mfg. Co., Chicago, Ill.
General Boilers Co., Waukegan, Ill.
Gorton & Lidgerwood Co., New York.
Grinnell Company, Providence, R. I.
Gurney Heater Mfg. Co., Boston, Mass.
Heggie Simplex Boiler Co., Joliet, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
International Heater Co., Utica, N. Y.
Kewanee Boiler Co., Kewanee, Ill.
Lebanon Boiler Works, Lebanon, Pa.
Molby Boiler Co., New York.
Monitor Boiler Co., Philadelphia, Pa.
National Radiator Co., Johnstown, Pa.
Newport Boiler Co., Chicago, Ill.
Niagara Radiator & Boiler Co., North Tonawanda, N. Y.
Page Boiler Co., Wm. H., New York
Pierce, Butler & Pierce Mfg. Co., New York.
Richmond Radiator Co., New York.
Standard Heater Co., Williamsport, Pa.
Stanwood Corporation, Cincinnati, Ohio.
Thatcher Co., Newark, N. J.
Titusville Iron Works, Titusville, Pa.
United States Radiator Corp., Detroit, Mich.
Universal Smokeless Boiler Co., Ravenna, Ohio.
Utica Heater Co., Utica, N. Y.
Weil-McLain Co., Chicago, Ill.

Power.

Fitzgibbons Boiler Co., New York.
Frost Mfg. Co., Chicago, Ill.
Heggie Simplex Boiler Co., Joliet, Ill.
Kewanee Boiler Co., Kewanee, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., Titusville, Pa.

CALORIMETERS.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Sarco Co., New York.

COILS, PIPE.

American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Pecco, Inc., St. Louis, Mo.
Whitlock Coil Pipe Co., Hartford, Conn.

Air.

New York Blower Co., Chicago, Ill.

CONCRETE INSERTS

Frank Radiator Bracket Co., Chicago, Ill.
Little Giant Mfg. Co., Minneapolis, Minn.

CONDENSERS.

Alberger Heater Co., Buffalo, N. Y.
American Radiator Co., Chicago, Ill.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Whitlock Coil Pipe Co., Hartford, Conn.

CONVERTERS, HOT WATER.

Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Co., New York.
Frank Heating & Engineering Co., O. E., Buffalo, N. Y.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co. Inc., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.
Wyckoff & Son Co., A., Elmira, N. Y.

COOLERS.

Oil.

Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

COOLING PLANTS & PONDS

Spray Engineering Co., Boston, Mass.

COOLING TOWERS.

Badger & Sons Co., E. B., Boston, Mass.
Cooling Tower Co., New York.

COPPER BOILERS.

Badger & Sons Co., E. B., Boston, Mass.
Dahlquist Mfg. Co., Boston, Mass.

COPPER KETTLES.

Badger & Sons Co., E. B., Boston, Mass.
Dahlquist Mfg. Co., Boston, Mass.

COVERING PIPE.

American District Steam Co., No. Tonawanda, N. Y.
Hornung, J. C., Chicago, Ill.
Johns-Manville Inc., New York.
Pearce & Co., W. H., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Wyckoff & Son Co., A, Elmira, N. Y.

DAMPERS, DUCT.

American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, O.
York Heating & Ventilating Co., Philadelphia, Pa.

DEHUMIDIFYING APPARATUS.

American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Engineering Corp., Newark, N. J.
Cooling Tower Co., New York.
Fleisher Co., Inc., W. L., New York.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

DISTILLERS, (Water).

Badger & Sons Co., E. B., Boston, Mass.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co. Inc., Buffalo, N. Y.

DRAFT APPLIANCES.

Wolff Coal Saver Co., Chicago, Ill.

DRYING SYSTEMS.

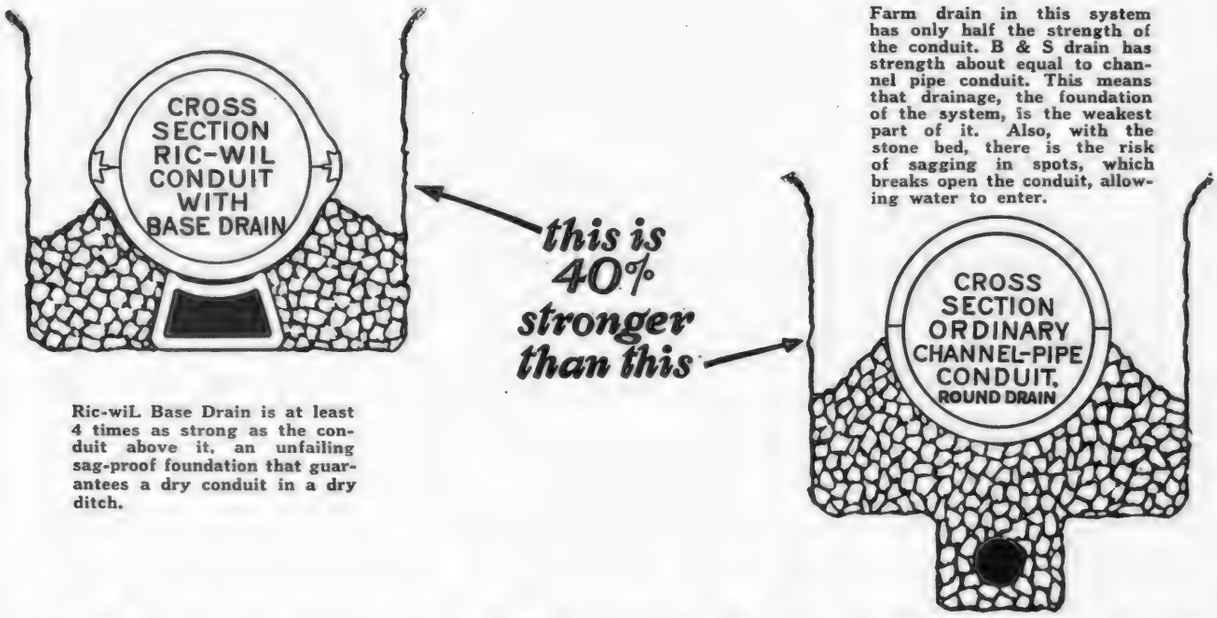
(See Air Cooling and Drying Systems.)

DUST COLLECTING SYSTEMS.

American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, New York.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
York Heating & Ventilating Co., Philadelphia, Pa.

DUST COLLECTORS.

American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Co., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F. Hyde Park, Mass.
York Heating & Ventilating Co., Philadelphia, Pa.


CROSS SECTION RIC-WIL CONDUIT WITH BASE DRAIN
this is 40% stronger than this
CROSS SECTION ORDINARY CHANNEL-PIPE CONDUIT. ROUND DRAIN

Ric-wiL Base Drain is at least 4 times as strong as the conduit above it, an unfailing sag-proof foundation that guarantees a dry conduit in a dry ditch.

Farm drain in this system has only half the strength of the conduit. B & S drain has strength about equal to channel pipe conduit. This means that drainage, the foundation of the system, is the weakest part of it. Also, with the stone bed, there is the risk of sagging in spots, which breaks open the conduit, allowing water to enter.

Stronger—and Costs Less!

LABORATORY tests with an approved Ames Iowa College Standard Machine—tests that took nearly 4 months and covered over 1000 ft. of all sizes of tile—demonstrated clearly that Ric-wiL Underground Conduit is 40% stronger than ordinary tile conduit with round drain.

But this extra strength, this additional insurance of a permanent intact installation costs the user nothing.

Actual experience on hundreds of jobs has proved that Ric-wiL can be installed with such savings of labor and materials—in definite figurable items—as to more than offset its slightly higher invoice price.

Cost, strength, efficiency—all are in the user's favor when you specify Ric-wiL.

Exact information regarding tests and installation economies gladly sent on request.

THE RIC-WIL COMPANY, CLEVELAND, OHIO

RIC-WIL
UNDERGROUND CONDUIT

Note how simply Ric-wiL goes together. Set base drain on graded trench bottom (8 sections an hour per man), wedge pipe support saddles in place, set on support sections, install pipe supports (30 an hour per man). Then install and insulate pipes.

In a recent case a contractor wrote into his bid: "Deduct 80c. per ft. if Ric-wiL Base Drain is used." He knew from experience.

ENGINEERS' SPECIFICATION INDEX (Continued)

ENGINES.

Steam, Automatic.

American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, O.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Stanwood Corporation, Cincinnati, Ohio.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

Steam, High Speed.

American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, O.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.
Sturtevant Co., B. F., Hyde Park, Mass.

EQUALIZING LOOPS.

Hoffman Specialty Co., New York.

EVAPORATORS.

Boiler Feed Make-Up.

Badger & Sons Co., E. B., Boston, Mass.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

EXHAUST HEADS.

Aeolus Dickinson Co., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Wright-Austin Co., Detroit, Mich.

EXHAUST SYSTEMS.

American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N Y.
Ilg Electric Ventilating Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

EXPANSION JOINTS.

American District Steam Co., No. Tonawanda, N. Y.
Badger & Sons Co., E. B., Boston, Mass.
Central Station Steam Co., Detroit, Mich.
Dahlquist Mfg. Co., Boston, Mass.
Griscom-Russell Co., New York.
Hornung, J. C., Chicago, Ill.
Howard Iron Works, Buffalo, N. Y.
Illinois Engineering Co., Chicago, Ill.
Pearce & Co., W. H., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Webster & Co., Warren, Camden, N. J.
Wheeler Condenser & Engineering Co., Carteret, N. J.

EXPANSION SHELLS

Phillips Drill Co., Chicago, Ill.

FANS, EXHAUST.

Amercan Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York.
Ilg Electric Ventilating Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

FEEDERS

Boiler

Cashin Co., W. D., Boston, Mass.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.

FILTERS, (Aerating).

Davis Engineering Corp., New York.
Griscom-Russell Co., New York.

Feed-Water.

Davis Engineering Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.

FITTINGS, FLANGED.

American District Steam Co., No. Tonawanda, N. Y.
Clow and Sons, Jas. B., Chicago, Ill.
Grinnell Company, Providence, R. I.

FLANGES.

American District Steam Co., No. Tonawanda, N. Y.
Jenkins Bros., New York.

GAS BURNERS

Cleveland Gas Burner & Appliance Co., Cleveland, Ohio.

GASKETS, METALLIC.

Sarco Co., New York.

GAUGE BOARDS.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Webster & Co., Warren, Camden, N. J.

GAUGES.

Altitude

Pierce, Butler & Pierce Mfg. Co., New York.

Draft.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

Hydraulic.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

Ounce Graduated.

Marsh & Co., Jas. P., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.

Pressure.

American Dist. Steam Co., North Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Pierce, Butler & Pierce Mfg. Co., New York.
Webster & Co., Warren, Camden, N. J.

Vacuum.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.
Webster & Co., Warren, Camden, N. J.

Vacuum (Compound).

Cashin Co., W. D., Boston, Mass.
Pierce, Butler & Pierce Mfg. Co., New York.

Water.

American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenburg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Jenkins Bros., New York.

GENERATOR COOLING SYSTEMS.

Badger & Sons Co., E. B., Boston, Mass.
Bayley Mfg. Co., Milwaukee, Wis.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Cooling Tower Co., New York.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.

GOVERNORS, (Pump).

Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Stickle Steam Specialties Co., Indianapolis, Ind.
Westinghouse Elec. &. Mfg. Co., East Pittsburgh, Pa.
Wright-Austin Co., Detroit, Mich.

GRATES

Dumping

Pyramid Iron Products Co., New York.

Rocking

Pyramid Iron Products Co., New York.

Shaking

Pyramid Iron Products Co., New York.

Shaking and Dumping

Pyramid Iron Products Co., New York.

Shaking, Circular

Pyramid Iron Products Co., New York.

Stationary

Pyramid Iron Products Co., New York.

HEAT CABINETS

Trane Co., LaCross, Wis.

HEATERS.

Domestic Water.

Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., No. Tonawanda, N. Y.
American Radiator Co., Chicago, Ill.
Badger & Sons Co., E. B., Boston, Mass.
Burnham Boiler Corp., Irvington, N. Y.
Dahlquist Mfg. Co., Boston, Mass.
Davis Engineering Co., New York.
Excelso Specialty Works, Buffalo, N. Y.
Frank Heating & Engineering Co., O. E., Buffalo, N. Y.
Monitor Boiler Co., Philadelphia, Pa.
National Pipe Bending Co., New Haven, Conn.
Page Boiler Co., Wm. H., New York.
Patterson-Kelley Co., New York.
Pierce, Butler & Pierce Mfg. Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., Erie, Pa.
Standard Heater Co., Williamsport, Pa.
Thermal Appliance Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

Electrical Unit

Ilg Electric Ventilating Co., Chicago, Ill.

Feed Water, (Closed).

Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Co., New York.
Frank Heating & Engineering Co., O. E., Buffalo, N. Y.
Griscom-Russell Co., New York.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., Erie, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Whitlock Coil Pipe Co., Hartford, Conn.

Feed Water, (Open).

Griscom-Russell Co., New York.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.

Fuel-oil.

Alberger Heater Co., Buffalo, N. Y.
American Blower Co., Detroit, Mich.
Davis Engineering Corp., New York.
Drying Systems, Inc., Chicago, Ill.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Inc., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

Air, Fan System.

Aerofin Corporation, Newark, N. J.
American Blower Co., Detroit, Mich.
American Radiator Co., Chicago, Ill.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Drying Systems, Inc., Chicago, Ill.
Johnson Fan & Blower Co., Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
New York Blower Co., Chicago, Ill.
Peerless Unit Ventilation Co., Inc., Long Island City, N. Y.
Sturtevant Co., B. F., Hyde Park, Mass.

Magazine Feed

Standard Heater Co., Williamsport, Pa.

Portable Unit Air.

American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
Dwyer Equipment Co., Chicago, Ill.
Ilg Electric Ventilating Co., Chicago, Ill.
Mueller Furnace Co., L. J., Milwaukee, Wis.
Pecco Incorporated, St. Louis, Mo.
Skinner Bros. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa
(See also Ventilators, Portable Unit.)

HEATING SYSTEMS.

"Gasteam".

James B. Clow & Sons, Chicago, Ill.

Vacuum.

Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.
Sarco Co., New York.
Standard Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind
Webster & Co., Warren, Camden, N. J.

YOUNG
CENTRIFUGAL VACUUM AND BOILER FEED PUMPS

Supplied in Standard Units of Seven Capacities

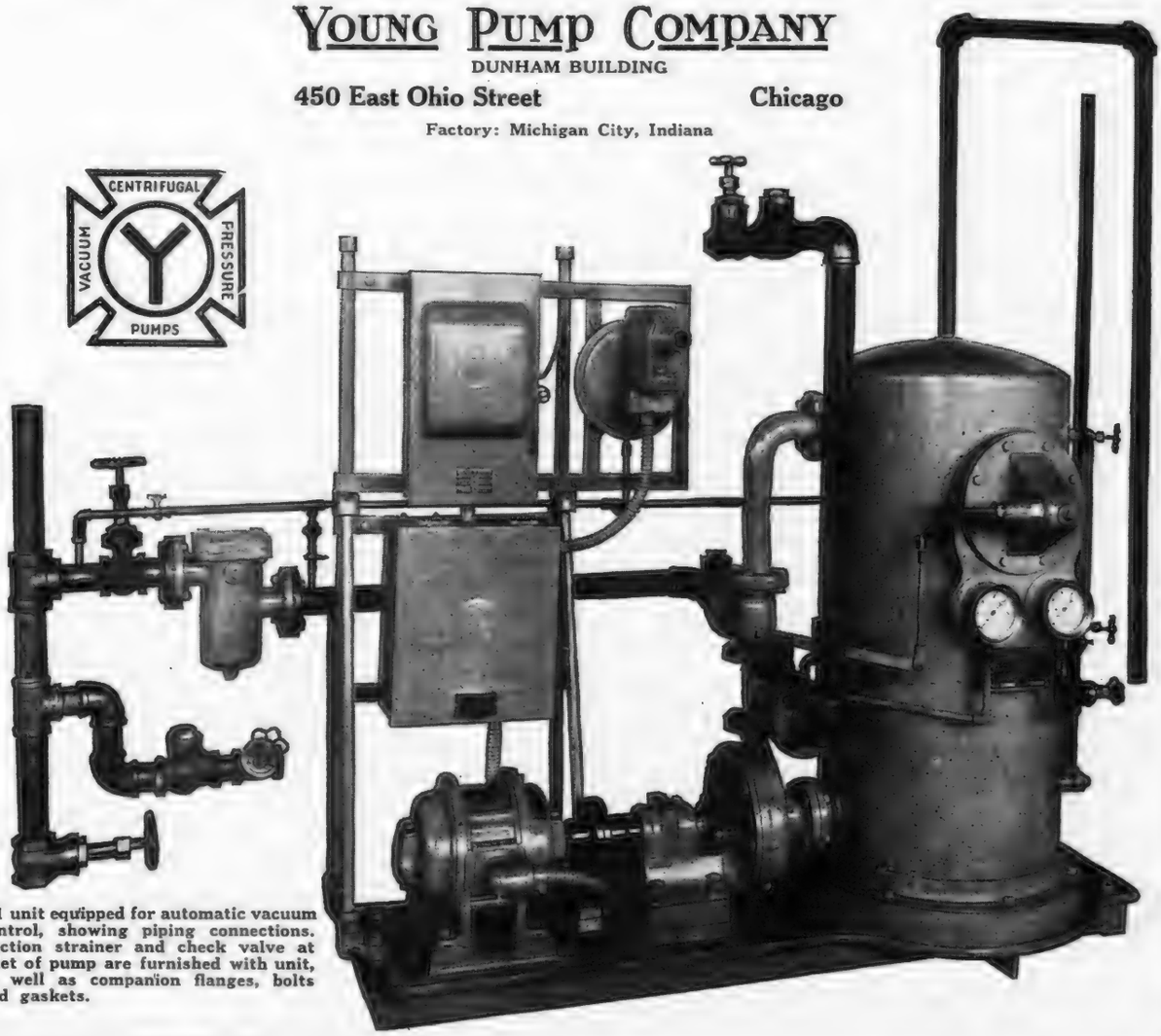
Noted for their Powerful Suction and Large Reserve Capacity

YOUNG Centrifugal Vacuum and Boiler Feed Pumps are designed to discharge water from the system four times faster than the normal rate of condensation. This is the maximum discharge with by-pass valve fully opened.

At times of peak load, for example when steam is first turned on, ample power and large reserve capacity of the pump is of vital importance.

Young Pump motors are of sufficient size to insure a powerful suction and maintain a large reserve capacity, this without being uneconomical in power consumption. The design of the Young Impeller and of the Exhauster combine to insure remarkable efficiency in these important factors. The Impeller is powerful, simple and positive. The Young Exhauster provides maximum vacuum and ample air and water capacity by breaking up the stream through the design of the exhauster nozzle and delivery tube, a feature covered by exclusive Young Pump patent applications. All of this is accomplished with a relatively small power consumption.

YOUNG PUMP COMPANY
DUNHAM BUILDING
450 East Ohio Street **Chicago**
Factory: Michigan City, Indiana



V1 unit equipped for automatic vacuum control, showing piping connections. Suction strainer and check valve at inlet of pump are furnished with unit, as well as companion flanges, bolts and gaskets.

ENGINEERS' SPECIFICATION INDEX (Continued)

Vapor.
American District Steam Co., No. Tonawanda, N. Y.
Barnes & Jones, Boston, Mass.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Gorton & Lidgerwood Co., New York.
Grinnell Company, Providence, R. I.
Haines & Co., Wm. S., Philadelphia, Pa.
Ideal Heating Equip. Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mouat Vapor Heating Co., Cleveland, O.
Nelson Corporation, Herman, Moline, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Sarco Co., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Standard Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Trane & Co., La Crosse, Wis.
Vapor Engineering Co., New York.
Webster & Co., Warren, Camden, N. J.

Water.
Grinnell Company, Providence, R. I.
Patterson-Kelley Co., New York.
Standard Heater Co., Williamsport, Pa.
Thrush & Co., H. A., Peru, Ind.

HUMIDIFIERS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N. J.
Drying Systems, Inc., Chicago, Ill.
Grinnell Company, Providence, R. I.
New York Blower Co., Chicago, Ill.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Mass.

HUMIDITY CONTROL.
American Blower Co., Detroit, Mich.
Atlas Valve Co., Newark, N. J.
Bayley Mfg. Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Drying Systems, Inc., Chicago, Ill.
Foxboro Co., Inc., The Foxboro, Mass.
Grinnell Company, Providence, R. I.
Klipfel Mfg. Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

INSTRUMENTS
Electric Measuring.
Bristol Co., Waterbury, Conn.
Westinghouse Electric & Mfg. Co., East Pittsburg, Pa.

Indicating and Recording.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Bailey Meter Co., Cleveland, O.
Foxboro Co., Inc., The Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
Sarco Co., New York
Westinghouse Elec. & Mfg. Co., East Pittsburg, Pa

INSULATING MATERIALS.
American District Steam Co., No. Tonawanda, N. Y.
Armstrong Cork & Insulation Co., Pittsburgh, Pa.
Hornung, J. C., Chicago, Ill.
Johns-Manville, Inc., New York.
Pearce & Co., W. H., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Universal Gypsum Co., Chicago, Ill.
Wyckoff & Sons, A., Elmira, N. Y.

MANOMETERS.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.

MECHANICAL DRAFT APPARATUS.
American Blower Co., Detroit, Mich.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buckeye Blower Co., Columbus, O.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park Mass.
L. J. Wing Co., New York.

METERS.
Condensation.
American Dist. Steam Co., No. Tonawanda, N. Y.
Central Station Steam Co., Detroit, Mich.
Hornung, J. C., Chicago, Ill.
Pearce & Co., W. H., Chicago, Ill.

Feed Water.
Central Station Steam Co., Detroit, Mich.
Feed Water (Wier Type).
Webster & Co., Warren, Camden, N. J.

Flow
American District Steam Co., North Tonawanda, N. Y.
Spray Engineering Co., Boston, Mass.
Pitot Tube.
American Blower Co., Detroit, Mich.
Steam.
American District Steam Co., No. Tonawanda, N. Y.
Foxboro Co., Inc., The Foxboro, Mass.

MOTORS (Electric).
Century Electric Co., St. Louis, Mo.
Janette Mfg. Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

NOZZLES, SPRAY
American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Manufacturing Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Air Conditioning Co. of America, Buffalo, N. Y.
Carrier Engineering Co., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Cooling Tower Co., New York
New York Blower Co., Chicago, Ill.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.

OIL BURNERS
Aetna Automatic Oil Burner, Inc., Providence, R. I.
American Nokol Co., Chicago, Ill.
Automatic Burner Corp., Chicago, Ill.
Automatic Home Heating Co., Pueblo, Colo.
Caloroil Burner Corp., New York
Chalmers Oil Burner Co., Minneapolis, Minn.
Combustion Fuel Oil Burner Co., Milwaukee, Wis.
Crosley Radio Corp., Cincinnati, Ohio.
Drying Systems, Inc., Chicago, Ill.
Electrol Incorporated, St. Louis, Mo.
Hardinge Bros., Inc., Chicago, Ill.
Johnson Co., S. T., Oakland, Cal.
Marr Oil Heat Machine Cor., Minneapolis, Minn.
May Oil Burner Corp., Baltimore, Md.
Nu-Way Corporation, Rock Island, Ill.
Petroleum Heat and Power Co., New York.
Rayfield Mfg. Co., Chicago, Ill.
Wilde Co., W. B., Peoria, Ill.
Winslow Boiler & Engineering Co., Chicago, Ill.

OIL BURNER EQUIPMENT
Janette Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
Monroe Machine Tool Co., Chicago, Ill.
Webster Electric Co., Racine, Wis.
Ignition
Webster Electric Co., Racine, Wis.

OZONE APPARATUS.
Air Conditioning & Engineering Co., St. Louis, Mo.
United States Ozone Co., Scottdale, Pa.

PIPE.
Cast Iron.
Clow & Sons, Jas. B., Chicago, Ill.
Steel.
National Tube Co., Pittsburgh, Pa.
Wood.
Wyckoff & Sons Co., A., Elmira, N. Y.

PIPE BENDING.
Badger & Sons Co., E. B., Boston, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Grinnell Company, Providence, R. I.
National Pipe Bending Co., New Haven, Conn.
Whitlock Coil Pipe Co., Hartford, Conn.

PIPE CASING (Wood).
American District Steam Co., No. Tonawanda, N. Y.
Wyckoff & Sons Co., A., Elmira, N. Y.

PIPE HANGERS.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.

PIPE, POWER.
Grinnell Company, Providence, R. I.

PIPE THREADING & CUTTING MACHINES
Standard Engineering Co., Ellwood City, Pa.

PUMPS.
Centrifugal.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Yeomans Bros. Co., Chicago, Ill.
Young Pump Co., Michigan City, Ind.
Condensation.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Wright-Austin Co., Detroit, Mich.
Yeomans Bros. Co., Chicago, Ill.
Rotary.
Nash Engineering Co., So. Norwalk, Conn.
Steam.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Nash Engineering Co., So. Norwalk, Conn.
Turbine.
Nash Engineering Co., So. Norwalk, Conn.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Yoemans Bros., Chicago, Ill.
Vacuum.
American Steam Pump Co., Battle Creek, Mich.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Chicago Pump Co., Chicago, Ill.
Du Moin Pump Sales Co., Des Moines, Iowa.
Economy Pumping Machinery Co., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Skidmore Corp., Chicago, Ill.
Trane Co., La Crosse, Wis.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Yeomans Bros., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

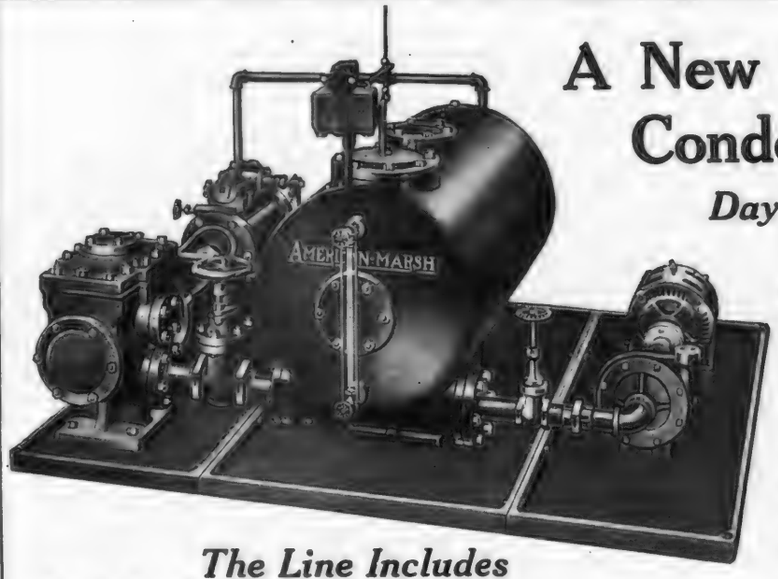
RADIATOR HANGERS.
Frank Radiator Bracket Co., Chicago, Ill.
Gloeckle, Jr., A. F., Rochester, N. Y.
Grinnell Company, Providence, R. I.
Hartmann Co., Charles, Brooklyn, N. Y.
Healy-Ruff Company, St. Paul, Minn.
Little Giant Mfg. Co., Minneapolis, Minn.
Pierce, Butler & Pierce Mfg. Co., New York.

RADIATORS.
"Gasteam."
James B. Clow & Sons, Chicago, Ill.
"Gaswater."
Clow & Sons, Jas. B., Chicago, Ill.

RADIATORS, STEAM AND WATER.
Aerofin Corp., Newark, N. J.
American Radiator Co., Chicago, Ill.
International Heater Co., Utica, N. Y.
Gurney Heater Mfg. Co., Boston, Mass.
National Radiator Co., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Co., New York.
Richmond Radiator Co., New York
Standard Heater Co., Williamsport, Pa.
United States Radiator Corp., Detroit, Mich.

RECEIVERS.
Air.
American District Steam Co., No. Tonawanda, N. Y.
The Brownell Co., Dayton, Ohio.
Kieley & Mueller, Inc., New York.
Sterling Engineering Co., Milwaukee, Wis.
Condensation.
Chicago Pump Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Yeomans Bros., Chicago, Ill.

REGULATORS.
Boiler-Feed.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.
Damper.
American Dist. Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
American Radiator Co., Chicago, Ill.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Honeywell Heating Specialties Co., Wabash, Indiana.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
National Regulator Co., Chicago, Ill.
Nelson Corporation, Herman, Moline, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Simplex Heating Specialty Co., Inc., Lynchburgh, Va.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Thrush & Co., H. A., Peru, Ind.
Trane Co., La Crosse, Wis.
L. J. Wing Mfg. Co., New York.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Foxboro Co., Inc., The Foxboro, Mass.
Fulton Co., Knoxville, Tenn.
Honeywell Heating Specialties Co., Wabash, Indiana.



A New American Marsh Condensation Pump

Day and Night Service

This new Condensation Pump is designed for use where there is a wide variation in steam pressure. When the steam pump stops operating because of lack of steam pressure a motor driven centrifugal pump, which is controlled automatically, keeps the return lines free from condensation. This is important, for it keeps the return lines clear and continues to operate until enough steam is generated to operate the steam pump. It is really a day and night pump. Practical, efficient and economical.

The Line Includes

Boiler Feed Pumps—Vacuum Pumps.
Hot Water Circulating Pumps.
Sump or Bilge Pumps.
Condensation Pumps, steam and motor driven, vertical and horizontal.
Automatic Boiler Feed Pumps and Receivers.

Write for Bulletin No. 58

AMERICAN STEAM PUMP COMPANY

BATTLE CREEK, MICHIGAN

CHICAGO OFFICE: 926 Monadnock Block **NEW YORK OFFICE: 17 Battery Place**

Good pumps cost LEAST—

Buy good pumps for your heating systems and enjoy freedom from constant shut-downs and expensive repairs.

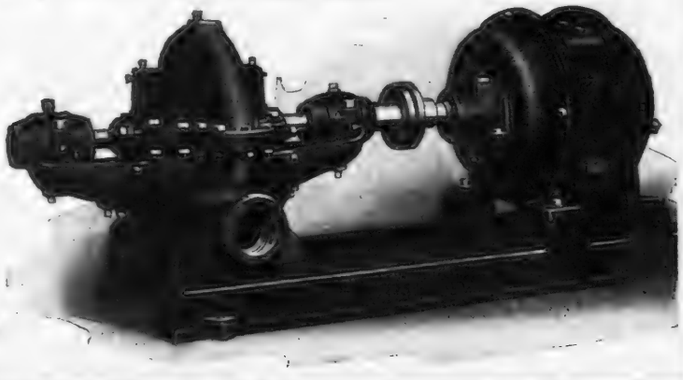
Buffalo Class "S" pumps have horizonntally divided casings; double suction, enclosed type impeller, hydraulically balanced. Clearance rings are brass, easily renewable. Shaft bearings are ring oiling. Thrust bearings are collars in each bearing in the smaller sizes, marine type on larger sizes. Brass bushed, extra deep stuffing boxes, bolted type glands.

In every particular, Buffalo Class "S" Pumps are ideal for heating service. Why not let us quote on your requirements?

Buffalo Steam Pump Company, 480 Broadway, Buffalo, N. Y.

In Canada:—Canadian Blower and Forge Company, Ltd., Kitchener, Ontario.

Standardize on "Buffalo" Class "S" Pumps



ENGINEERS' SPECIFICATION INDEX (Continued)

Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Stickle Steam Specialties Co., Indiapapolis, Ind.
Thrush & Co., H. A., Peru, Ind.

Temperature.

American Radiator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Engineering Corporation, Newark, N. J.
Foxboro Co., Inc., The Foxboro, Mass.
Fulton Co., Knoxville, Tenn.
Gold Car Heating & Lighting Co., Brooklyn.
Honeywell Heating Specialties Co., Wabash, Indiana.
Hornung, J. C., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.
White Mfg. Co., St. Paul, Minn.

SEPARATORS.

Oil.

Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Stickle Steam Specialties Co., Indianapolis, Ind.
Wright-Austin Co., Detroit, Mich.

Steam.

American District Steam Co., No. Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

SOUND PROOFING MATERIALS

Cork Foundation Co., New York.

SPRAY COOLING SYSTEMS.

Badger & Sons Co., E. B., Boston, Mass.
Bayley Mfg. Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cooling Tower Co., New York.
Seymour, James M., Newark, N. J.

SPRAY NOZZLES

(See Nozzles, Spray)

STOKERS

CombustiKator Co., Chicago, Ill.
Domestic Stoker Co., New York.

STRAINERS.

Oil.

Griscom-Russell Co., New York.
Kieley & Mueller, Inc., New York.
Monroe Machine Tool Co., Chicago, Ill.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y

Steam.

American Dist. Steam Co., No. Tonawanda, N. Y.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regular Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Sarco Co., New York.
Sterling Engineering Co, Milwaukee, Wis.
Wright-Austin Co., Detroit, Mich.

Water.

American Dist. Steam Co., No. Tonawanda, N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Sarco Co., New York.
Spray Engineering Co., Boston, Mass.

THERMOMETERS.

(Recording and Indicating).

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The Foxboro, Mass.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.

Water.

Marsh & Co., Jas. P., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.

THERMOSTATS.

American Radiator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Fulton Co., Knoxville, Tenn.
Gold Car Heating & Lighting Co., Brooklyn.
Honeywell Heating Specialties Co., Wabash, Indiana.
Johnson Service Co., Milwaukee, Wis.
Klipfel Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.
Thrush & Co., H. A., Peru, Ind.
White Mfg. Co., St. Paul, Minn.

TRAPS.

Radiator.

Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D. Boston, Mass.
Dunham, C. A., Co., Chicago, Ill.
Hoffman Specialty Co., New York.
Ideal Heating Equipment Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Mouat Vapor Heating Co., Cleveland, O.
Nelson Corporation, Herman, Moline, Ill.
O-E Specialty Co., Milwaukee, Wis.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.

Return.

American Blower Co., Detroit, Mich.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago Ill.
Johns-Manville, Inc., New York.
Kieley & Mueller, Inc., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mouat Vapor Heating Co., Cleveland, O.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Simplex Heating Specialty Co., Inc., Lynchburgh, Va.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

Steam.

American Blower Co., Detroit, Mich.
American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Davis Engineering Co., New York.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johns-Manville, Inc., New York.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Pearce & Co., W. H., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.
Stickle Steam Specialties Co., Indianapolis, Ind.
Trane Co., La Crosse, Wis.
Wright-Austin Co., Detroit, Mich.

Vacuum.

American Blower Co., Detroit, Mich.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Pearce & Co., W. H., Chicago, Ill.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

TURBINES (Steam).

Buffalo Forge Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co. East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.

TURBO-BLOWERS.

Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

UNDERGROUND PIPE CONDUITS.

American District Steam Co., No. Tonawanda, N. Y.
Hornung, P. C., Chicago, Ill.
Johns-Manville, Inc., New York
Pearce & Co., W. H., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Wyckoff & Son, A., Elmira, N. Y.

VACUUM CLEANING APPARATUS.

American Radiator Co., Chicago, Ill.
Spencer Turbine Co., Hartford, Conn.
Sturtevant Co., B. F., Hyde Park, Mass.

VALVES.

Air (Automatic).

American Radiator Co., Chicago, Ill.
Commonwealth Brass Corporation, Detroit, Mich.
Fulton Co., Knoxville, Tenn.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Jenkins Bros., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Pierce, Butler & Pierce Corp., New York.

Air Relief.

American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.
Sterling Engineering Co., Milwaukee, Wis.
Webster & Co., Warren, Camden, N. J.

Back Pressure.

Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.
Stickle Steam Specialties Co., Indianapolis, Ind.

Balanced.

American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.
Stickle Steam Specialties Co., Indianapolis, Ind.

Blow-off.

Jenkins Bros., New York.
The Wm. Powell Co., Cincinnati, O.

Check.

Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.

Float.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Grinnell Company, Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller Co., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Stickle Steam Specialties Co., Indianapolis, Ind.

Gate.

American District Steam Co., No. Tonawanda, N. Y.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Marsh Valve Co., Erie, Pa.
Milwaukee Valve Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.

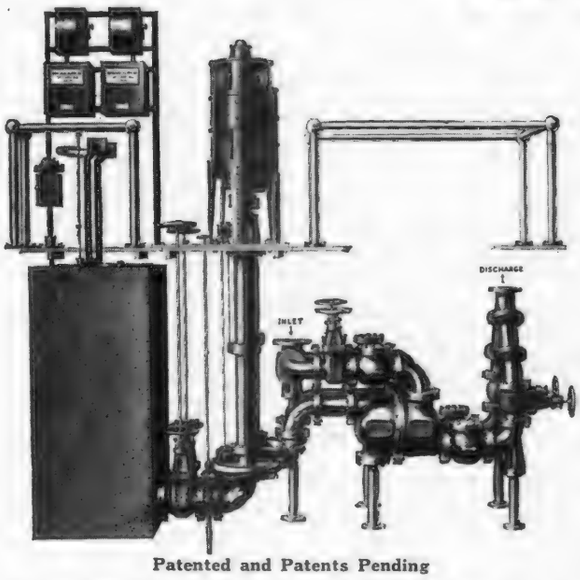
Globe, Angle and Cross.

Commonwealth Brass Corp., Detroit, Mich.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Marsh Valve Co., Erie, Pa.
Milwaukee Valve Co., Milwaukee, Wis.
Pierce, Butler & Pierce Corp., New York.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.

Hydraulic-Operating.

Atlas Valve Co., Newark, N. J.
Kieley & Mueller, Inc., New York.

Let a "Chicago Flush-Kleen" Do That Disagreeable Task



Patented and Patents Pending

Quality Centrifugal Pumps for Every Purpose

SEWAGE CIRCULATING CONDENSATION
BILGE FIRE HOUSE VACUUM

The distasteful task of cleaning a strainer basket on a Sewage Ejector is no longer necessary.

Illustrated at the left is the Chicago "Flush-Kleen" dry Basin Sewage Ejector unit. The construction of the "Flush-Kleen" is a development in Dry Basin Sewage Ejectors which entirely eliminates the old-fashioned strainer basket.

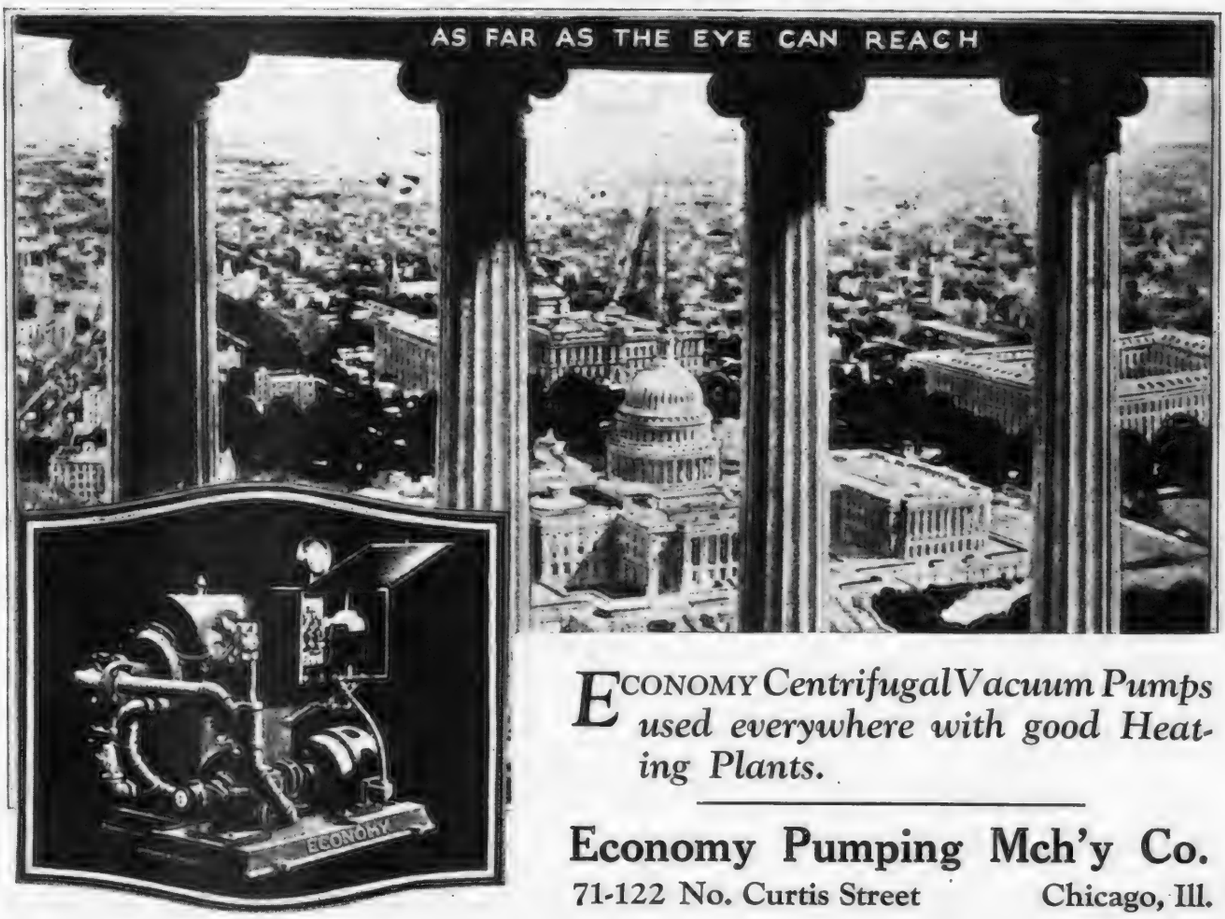
Let our Bulletin 126 tell you more about this new unit based upon the "Flow-Reversal" method.

"Flush-Kleen" Dry Basin Sewage Ejectors are now giving satisfaction in the Saenger Theatre, New Orleans; the Rome School, Rome, New York; and the Merchants and Manufacturers Building, New York City. Simplicity in construction of the "Flush-Kleen" strainer has been proven in the above installations where not a moment's trouble has been experienced.

Ask for Bulletin 126—Gladly furnished upon request

CHICAGO PUMP COMPANY

2325 Wolfram St. Chicago, Ill.



ECONOMY Centrifugal Vacuum Pumps used everywhere with good Heating Plants.

Economy Pumping Mch'y Co.

71-122 No. Curtis Street Chicago, Ill.

ENGINEERS' SPECIFICATION INDEX (Continued)

Non-Return.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.

Radiator.
American Radiator Co., Chicago, Ill.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Commonwealth Brass Corporation, Detroit, Mich.
Dunham Co., C. A., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Gorton & Lidgerwood Co., New York.
Honeywell Heating Specialties Co., Wabash, Indiana.
Ideal Heating Equip. Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill
Jenkins Bros., New York.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
Trane Co., La Crosse, Wis.
Scott Valve Mfg. Co., Detroit, Mich.
Simplex Heating Specialty Co., Inc., Lynchburg, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.

Reducing.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.

Regulating.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Fulton Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.

Relief (Water).
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, Ohio.

Safety.
American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Jenkins Bros., New York.
Powell Co., Wm., Cincinnati, O.

Stop and Check.
(See Valves, Non Return).

VENTILATING HEATERS

Portable Unit.
American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, Ohio.
Mueller Furnace Co., L. J., Milwaukee, Wis.
Nelson Corporation, Herman, Moline, Ill.
Nesbitt, John J., Inc., Atlantic City, N. J.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilation Co., Inc., Long Island City, N. Y.
Stickle Steam Specialties Co., Indianapolis, Ind.
Sturtevant Co., B. F., Hyde Park, Mass.
York Heating & Ventilating Co., Philadelphia, Pa.
(See also Heaters, Portable Unit Air).

VENTILATING SYSTEMS
Air Conditioning & Engineering Co., St. Louis, Mo.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N. J
Clarage Fan Co., Kalamazoo, Mich.
Ilg Electric Ventilating Co., Chicago, Ill.
Nelson Corporation, Herman, Moline, Ill.
Nesbitt, John J., Inc., Atlantic City, N. J.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilation Co., Inc., Long Island City, N. Y.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa

VENTILATORS.
Aeolus Dickinson Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Ilg Electric Ventilating Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilation Co., Inc., Long Island City, N. Y.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa

Mushroom.
Aeolus Dickinson Co., Chicago, Ill.
Knowles Mushroom Ventilator Co., New York
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.
Ventilating Products Co., Chicago, Ill.

WATER STERILIZERS
Air Conditioning & Engineering Co., St. Louis, Mo.

WEATHER STRIPS.
Metal.
Athey Company, Chicago, Ill.
Chamberlin Metal Weather Strip Co., Detroit, Mich.
Higgin Manufacturing Co., Newport, Ky.

IRON BODY GATE VALVES

SCREWED, FLANGED
AND
HUB END STYLES

NON-RISING STEM
AND
O. S. and Y. PATTERNS

ALSO MANUFACTURERS OF
Cast and Malleable Iron Fittings

Illinois Malleable Iron Company

1801 Diversey Parkway :-: :-: **Chicago, Ill.**

YEOMANS

YEOMANS PUMPS GIVE YEOMAN SERVICE

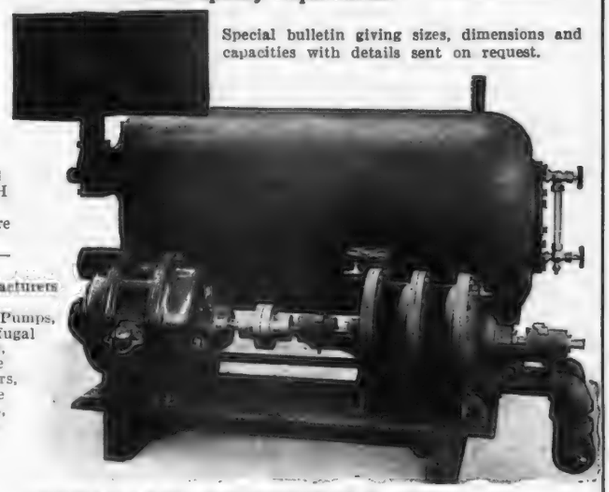
CONDENSATION PUMPS

AUTOMATIC
ELECTRIC
NOISELESS
RUGGED

The mark of Dependability

Built for all pressure and capacity requirements

Special bulletin giving sizes, dimensions and capacities with details sent on request.



Special Type H High Pressure Unit.

Also manufacturers of Bilge Pumps, Centrifugal Pumps, Sewage Ejectors, Sewage Pumps, etc.

YEOMANS BROTHERS CO.
1421 Dayton St. Representatives in all principal cities. Chicago, Ill.

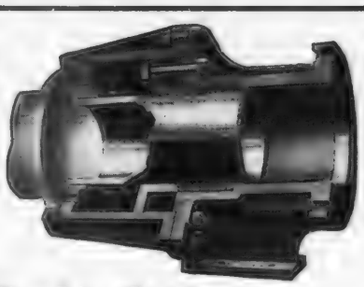
DEPENDABILITY

CENTRAL STATION STEAM CO.
2912 East Woodbridge St.
DETROIT, MICHIGAN

MANUFACTURERS OF
Cadillac Condensation Meters
Detroit Feed Water Meters

Packingless Expansion Joints and other special fittings for underground steam distribution mains.

HOWARD Guided Expansion Joint



For Pipe Line Service

Eliminates trouble from Expansion and Contraction, saves space, labor and repair bills; the construction is mechanically correct.

ALBERGER HEATER CO. 285 Chicago St.
HOWARD IRON WORKS Buffalo, N. Y.

Architects, Engineers and Contractors

THOSE of you who have used the unit know its qualities and have shown that it is satisfactory by using it again. Five years of satisfactory service has made us many friends. The demand for a dependable unit is fully met in the Skidmore apparatus. It is of pleasing appearance, compact in design, occupies less floor space than any other unit and maintains its efficiency. Material and workmanship are the best that can be secured.

All parts are machined to gauge and are interchangeable.

Due to the principle of operation no close clearances are necessary in the moving parts, thereby eliminating loss in efficiency through wear.

A self-contained unit all on one base with all interconnecting piping eliminated. Furnished in seven sizes for pressures from 10 to 60 lbs. for continuous or automatic service.

To those who have not used the unit but are interested, we will gladly furnish a list of installations in your location.

The Skidmore Hydro Turbine Vacuum and boiler feed pump has come to stay. The suit for infringement of Patent was decided in our favor, by both District and Appellate Courts.

WRITE FOR BULLETIN NO. 4.

SKIDMORE CORPORATION
General Offices and Factory
1535 Dayton St. CHICAGO, U. S. A.
Representatives in principal cities

ALPHABETICAL INDEX OF ADVERTISEMENTS

A

Absolute Con-Tac-Tor Corp..... 160
Aeolus Dickinson Co..... 138
Aerofin Corporation 130
Aetna Automatic Oil Burner, Inc. 45
Air Conditioning & Engineering Co. 154
Alberger Heater Co..... 193
American Blower Co..... 137
American District Steam Co.... 181
American Gas Products Corp.... 22
American Nokol Co..... 34
American Radiator Co., 15, 165, 167, 175
American Schaeffer & Budenberg Corp. 40
American Steam Pump Co..... 189
Associated Business Papers, Inc. 164
Athey Co. 163
Atlas Valve Co..... 156
Automatic Burner Corp..... 44
Automatic Home Heating Co... 36
Autovent Fan & Blower Co.... 129

B

Badger & Sons Co., E. B..... 183
Barnes & Jones..... 59
Bishop & Babcock Sales Co..... 58
Bristol Co. 150
Brownell Co. 176
Buckeye Blower Co..... 127
Buffalo Forge Co..... 141
Buffalo Steam Pump Co..... 189
Burnham Boiler Corp..... 16

C

Carrier Air Conditioning Co. of America 141
Carrier Engineering Corp..... 138
Cashin Co., W. D..... 36
Central Station Steam Co..... 193
Century Electric Co..... 173
Chalmers Oil Burner Co..... 152
Chamberlin Metal Weather Strip Co. 159
Chicago Pump Co..... 191
Clarage Fan Co..... 2
Cleveland Gas Burner & Appliance Co. 24
Clow & Sons, James B..... 20
CombustiKator Co. 29
Combustion Fuel Oil Burner Co.. 20
Commonwealth Brass Corp..... 162
Continental Heater Corp..... 12
Cooling Tower Co..... 144
Cork Foundation Co..... 140
Crosley Radio Corp..... 46

D

Davis Engineering Corp..... 31
Davis Regulator Co., G. M..... 134
DeBothezat Impeller Co., Inc... 142
Drying Systems, Inc.....56, 57
Dunham Co., C. A..... 62
Duro Air Filter Co..... 150
Dwyer Equipment Co..... 148

E

Economy Pumping Machinery Co. 191
Efficient Heating Boiler Co..... 39
Electrol Incorporated 32
Excelso Specialty Works, Inc... 54

F

Fitzgibbons Boiler Co..... 14
Foxboro Co., Inc..... 160
Frank Heater & Engineering Co., Inc., O. E..... 156
Frost Mfg. Co..... 13
Fulton Co. 133

G

Games Slayter 49
General Air Filters Corp..... 152
General Boilers Co..... 4
Gleockle, Jr., A. F..... 168
Gold Car Heating & Lighting Co. 142
Gorton & Lidgerwood Co..... 136
Grinnell Co. 135
Griscom-Russell Co. 179
Gurney Heater Mfg. Co..... 6

H

Haines & Co., Wm. S..... 170
Hardinge Brothers Co., Inc..... 41
Hartmann Co., Chas..... 146
Healy-Ruff Co. 148
Heating & Piping Contractors, National Ass'n 182
Heggie-Simplex Boiler Co..... 66
Higgin Mfg. Co..... 144
Hoffman Specialty Co..... 196
Honeywell Heating Specialties Co. 171
Hornung, J. C..... 158
Howard Iron Works..... 193

I

Ideal Heating Equipment Co... 156
Ilg Electric Ventilating Co..... 149
Illinois Eng. Co..... 51
Illinois Malleable Iron Co..... 192
Inland Iron Works..... 176
International Heater Co..... 9

J

Jenkins Bros. 162
Johns-Manville, Inc. 181
Johnson Co., S. T..... —
Johnson Fan & Blower Co..... 146
Johnson Service Co..... 68

K

Kewanee Boiler Co..... 5
Kieley & Mueller, Inc..... 180
Klipfel Mfg. Co..... 53
Kleen-Heet 37
Knowles Mushroom Ventilator Co. 140

L

Lebanon Boiler Works..... 3
Little Giant Mfg. Co..... 142

M

Marsh & Co., Jas. P..... 3
Marsh Valve Co..... 48
Mason Regulator Co..... 173
May Oil Burner Corp..... 42
McAlear Mfg. Co..... 55
McDonnell & Miller.....26, 35
Midwest Air Filters, Inc..... —
Milwaukee Valve Co..... 64
Minneapolis Heat Regulator Co. 169
Modine Mfg. Co..... 143
Molby Boiler Co..... 17
Monarch Sales & Engineering Co. 148
Monitor Boiler Co..... 27
Monroe Machine Tool Co..... 38
Mount Vapor Heating Co..... 174
Mueller Co. 61
Mueller Furnace Co., L. J..... 154

N

Nash Engineering Co..... 128
National Pipe Bending Co..... 178
National Radiator Co..... 25
National Regulator Co..... 179
National Tube Co..... 28
Nelson Corp., Herman..... 65
Nesbitt, Inc., John J..... 151
Newport Boiler Co..... —
New York Blower Co..... 153
Nu-Way Corp. 50

O

O-E Specialty Mfg. Co..... 18

P

Page Boiler Co., Wm. H..... 19
Patterson-Kelley Co. 180
Pearce & Co., W. H..... 180
Pecco Incorporated 145
Peerless Unit Ventilation Co.... 155
Petroleum Heat & Power Co.... 43
Phillips Drill Co..... 136
Pierce, Butler & Pierce Mfg. Co. —
Powell Co., Wm..... 134
Powers Regulator Co....168, 172, 178
Pyramid Iron Products Co..... 176

R

Rayfield Mfg. Co..... 33
Reed Air Filter Co., Inc..... 157
Ric-wiL Co. 185
Ross Heater & Mfg. Co. 160

S

Sarco Co. 34
Schutte & Koerting Co..... 156
Scott Valve Co..... 166
Seymour, James M..... 142
Simplex Heating Specialty Co.. 152
Sims Co. 170
Skidmore Corp. 193
Skinner Bros. Mfg. Co..... 147
Spencer Heater Co..... 21
Spencer Turbine Co..... 194
Spray Engineering Co..... 132
Standard Engineering Co..... 168
Stanwood Corp. 31
Sterling Engineering Co..... 146
Stickle Steam Specialties Co.... 166
Sturtevant Co., B. F..... 139

T

Thatcher Co. 23
Thermal Appliance Co..... 16
Thrush & Co., H. A..... 47
Titusville Iron Works Co..... 10
Trane Co. 52, 60

U

United States Radiator Corp.... 8
Universal Gypsum Co..... 161
Universal Smokeless Boiler Co.. 18
Utica Heater Co... 11

V

Vapor Engineering Co..... —
Ventilating Products Co..... 144
Vinco Co., Inc..... 177

W

Want Ads 138
Webster & Co., Warren..Front cover
Webster Electric Co..... 30
Weil-McLain Co. 195
Westinghouse Elec. & Mfg. Co.. 63
Wheeler Condenser & Engineering Co. 174
White Mfg. Co..... 150
Whitlock Coil Pipe Co. 176
Wing Mfg. Co., L. J..... 140
Winslow Boiler & Engineering Co. 37
Wolff Coal Saver Co..... 7
Wyckoff & Son Co., A..... 160

Y

Yeomans Bros. Co..... 193
York Heating & Ventilating Corp. 152
Young Pump Co..... 187

MELLON NATIONAL BANK, PITTSBURGH

Architects: Trowbridge & Livingston
E. P. Mellon, *Associated*

A BANK, as everyone knows, is a smooth running organization. Everything is carefully planned beforehand and then executed when it is found undeniably correct. In short, banks are conservative—yet progressive.

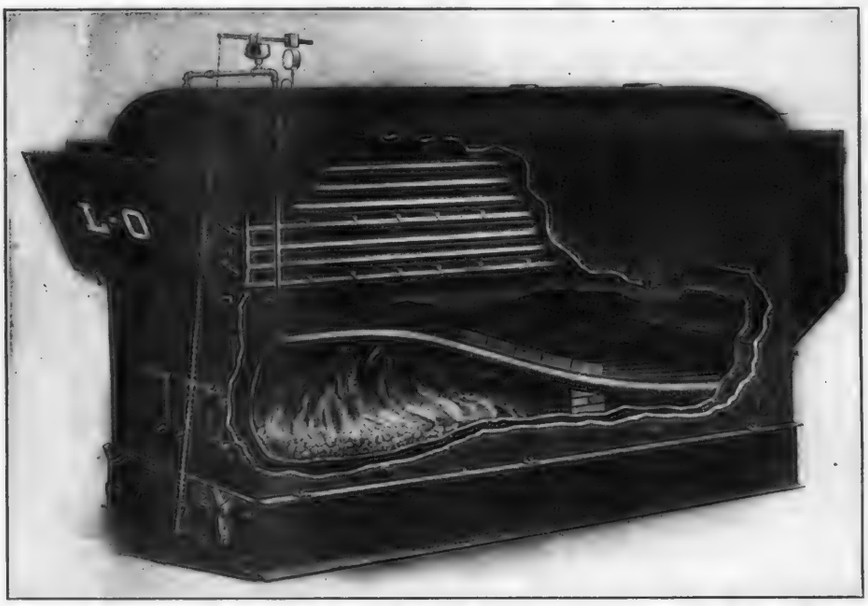
Conservatism on the part of a bank extends to the equipment. Therefore, when the new Mellon National Bank of Pittsburgh was constructed, all equipment was investigated as to its soundness, its ability, and economy. The Spencer Cleaning System was recognized as having these qualities. The Spencer System makes easy and shortens the work. Quick and sure. No dust or dirt is overlooked.

SPENCER TURBINE CO.
Hartford, Conn.

Your problems will be carefully analyzed by our Engineering Department without obligation.

SPENCER CENTRAL CLEANING SYSTEMS

LEBANON L-O BOILERS



WHY L-O BOILERS EXCEL

1. "L-O"er Costs
2. "L-O" and Compact
   Saves Space and Excavating
3. Larger Grates for "L-O"-grade Coals
4. Over "L-O"ds, with Very Dry Steam
5. Single Pass of Tubes
   means Adequate Area for Gas F "L-O"; or Boiler Capacity
6. "L-O" Draft Resistance
   of Single Pass Tubes helps greatly with Poor Chimneys
7. "L-O" Water Line

LEBANON BOILER WORKS

J. K. PETTY & CO., Inc., Proprietors

PHILADELPHIA OFFICE
507 Harrison Bldg.
(15th & Market Sts.)

Main Office and Works:
1244 Buttonwood Street
LEBANON, PA.

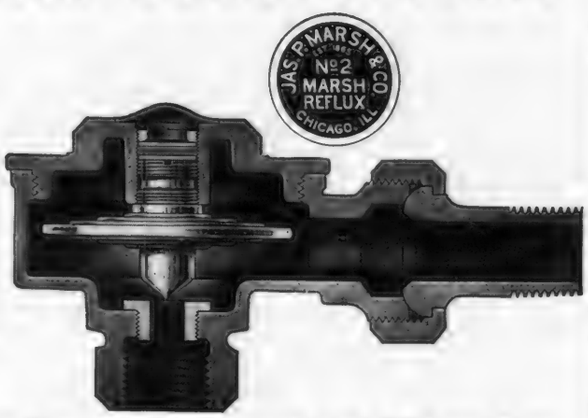
Koithan & Pryor, Representatives
39 Cortlandt St., NEW YORK CITY

Representatives in Principal Cities

MARSH REFLUX THERMOSTATIC RADIATOR TRAPS

GUARANTEE ON EVERY TRAP

If any Marsh Reflux Trap might develop a defect in material, workmanship or operation inside of five years after date of installation, such Trap would be replaced free of charge.



The Most Economical, Practical and Efficient Trap for the Average Sized Unit

Marsh Reflux Traps assure full efficiency of Radiator Coil and System.

Automatically discharge air and the water of condensation as fast as it is formed.

The Trap closes the instant steam or vapor strikes the thermostatic diaphragm. Vapor or steam cannot pass through the Trap; therefore every atom of heat is given off in the radiator or coil.

Just one movable part—nothing loose to rattle, chatter or make a noise.

Neat in appearance, handsomely finished and heavily nickel-plated.

The Economical, Practical and Efficient Trap for Both Small and Large Units

Marsh Reflux Traps are all-metal construction including heavy cast brass body, handsomely nickel-plated and with extra heavy special tail piece.

The one movable part—a genuine phosphor bronze non-collapsible Thermostatic Diaphragm—contains the combination of volatile fluids so balanced as to, at all times, distinguish between air and water of condensation and vapor or steam. So corrugated and constructed to eliminate the slightest possibility of rupture from alternate expansion and contraction.

JAS P. MARSH & CO.

114-124 So. Clinton St. Chicago
ESTABLISHED 1865

61 YEARS CONTINUOUS EXPERIENCE IN MANUFACTURE OF STEAM SPECIALTIES

Manufacturers of Radiator Traps and Specialties—Automatic Air Valves and Vents—Indicating and Recording Gauges

Agents for Great Britain and Ireland: Ohatterton & Co., 30 Fetter Lane, E. C. 4, London.
Agents for Dominion of Canada: Taylor-Forbes Co., Ltd., Guelph, Ontario.

Plant: The Bamberger-Reinthal Co., Cleveland, Ohio.

Heating Load: 14,786 sq. ft., total equivalent cast iron radiation.

Original Installation (replaced after three years): Two cast iron boilers, rated at 8,000 sq. ft. each.

Present Heating Plant (now beginning third year): One No. 625 Pacific Boiler, rated at 15,500 sq ft.

STEEL HEATING BOILERS · PACIFIC · WAUKEGAN ILLINOIS

Here Heating Was a Failure—Until They Installed a Pacific

After three years of difficulty with another type of boiler, this Pacific installation solved a troublesome heating problem. Smooth, dependable operation instead of annoying shutdowns—adequate capacity to heat the building, doing away with former difficulties in maintaining the proper temperature—these were two Pacific advantages which made the owners enthusiastic.

But the Pacific did more. It accomplished these results with 28% less fuel. Coal consumption for the season of 1923-4, with another type of boiler, was 290 tons. During the season of 1924-5, the Pacific burned 210 tons.

The owners have given complete details of their experience with Pacific Steel Heating Boilers in the letter quoted here. It tells an interesting story, typical of Pacific results in heating buildings everywhere.

Write for catalogs and complete information.

What the Owners Say

"Unable to heat our building satisfactorily with cast iron boilers"

"Experienced considerable trouble with cracked sections, which tied us up when we least desired it"

"Experience of the last two years has more than warranted our decision to purchase a Pacific Boiler"

"With lower coal consumption, we were able to heat our building without pushing the boiler to anywhere near its capacity"

GENERAL BOILERS COMPANY, *Waukegan, Illinois*
BRANCH OFFICES IN PRINCIPAL CITIES.

PACIFIC
STEEL HEATING BOILERS

TABASCO [Hot Stuff].

Steel Water Heaters

BUILT FOR
CITY WATER PRESSURES
Standard 60 pounds
Extra Heavy 100 pounds
Sizes 130 to 700 gallons per hour

Tabasco Water Heaters are built of the same grade steel plate, and riveted together in the same faultless manner, as the famous Kewanee Boilers. They won't crack and leak in service but cheerfully supply an abundance of hot water year after year.

AND they burn every kind of *coal* and *oil fuel* or *gas* efficiently, without any fuss or coaxing.

AGAIN why risk cancellation of insurance where city water pressure exceeds thirty pounds when SAFETY, with economy, can be secured by installing a Riveted Steel Tabasco Water Heater?

Surface Burner (as shown)
or
Magazine Feed

KEWANEE BOILER COMPANY

KEWANEE, ILLINOIS

Steel Heating Boilers, Radiators, Tanks and Water Heating Garbage Burners

BRANCHES

ATLANTA, 1522 Candler Bldg.
BOSTON, 1140 Little Bldg., 90 Boylston St.
CHARLOTTE, N. C. 605 Johnston Bldg.
CHATTANOOGA, 1104 James Bldg.
CHICAGO, 322 W. Washington Blvd.
CINCINNATI, P. O. Box 75
CLEVELAND, Superior Ave., N.E., at 17th St.
DALLAS, 1903-4 Santa Fe Bldg.
DENVER, 1226-28 California St.
DES MOINES, 707 Hubbell Bldg.
DETROIT, 2051 W. La Fayette Blvd.
EL PASO, 1520 N. Campbell St.
GRAND RAPIDS, 402½ Mich. Trust Bldg.
INDIANAPOLIS, 221 Ind. Term. Warehouse
KANSAS CITY, 2014 Wyandotte St.
LITTLE ROCK, 313-15 E. Markham St.
LOS ANGELES, 306 Crocker St.
MEMPHIS, 1812 Exchange Bldg.
MILWAUKEE, 440 Barclay St.
MINNEAPOLIS, 708 Builders Exchange Bldg.
NEW ORLEANS, 1018 New Orleans Bk. Bldg.
NEW YORK, 570 Seventh Ave.
PHILADELPHIA, 806 Real Est. Trust Bldg.
PITTSBURGH, Empire Bldg.
ST. LOUIS, 4200 Forest Park Blvd.
SALT LAKE CITY, 204 Dooly Bldg.
SAN ANTONIO, 502 Calcasieu Bldg.
SAN FRANCISCO, 635 Mission St.
SEATTLE, 326 Columbia St.
TOLEDO, 415 13th St.

CANADIAN REPRESENTATIVES—Dominion Kewanee Boiler Co., Ltd., 66 Richmond St., East, Toronto 2, Ontario

"Warm Welcome"

Gurney

No. 935 Water Boiler

(*pictured*)

Fills completely the requirements of the largest heating proposition. Steam or water. This type of sectional boiler enables you to enter into successful competition on church, schoolhouse, garage, etc., heating jobs.

A flexible boiler ranging in height from 39 1/2" for smaller headroom to 72 1/2" high for heavy duty.

This photo is of No. 935 Water Boiler, showing design which assures great service under all conditions.

Gurney Simplicity

It doesn't require a business general to figure out the value of a Gurney Boiler. It doesn't take an organization to sell it. It doesn't take an engineer to run it.

For over 50 years Gurney engineers have labored to produce a heating plant that will appeal equally to the man selling it and to the prospective buyer.

Investigate now. Apply the many-sided merit of Gurney Boilers to your own business. There's a future in it for you.

GURNEY HEATER M'F'G COMPANY
GENERAL OFFICES, BOSTON, MASS.
93-97 OLIVER STREET, FORT HILL SQUARE

GURNEY HEATER CO., INC.
NEW YORK
MANLY ST. COR. ANABLE AVE.
LONG ISLAND CITY

GURNEY HEATER M'F'G CO.
RICHMOND, VA
418 EAST MAIN STREET

GURNEY HEATER CO., INC.
PHILADELPHIA
108 NORTH 17TH ST.

Wolff Draft Conditioners

Save Fuel—whether coal or oil is burned
Help maintain constant heat, with less labor
Reduce ashes
Minimize smoke
Keep radiators warm later after banking

Installations in more than 5300 Chicago Buildings prove it

By properly "conditioning" the draft, according to the amount of heat needed, Wolff Draft Conditioners save anywhere from 25 to 50% of the fuel—whether coal or oil is used. They are not a new, nor unproved device, but on the contrary have "made good" in more than 5300 installations in the finest buildings of all types.

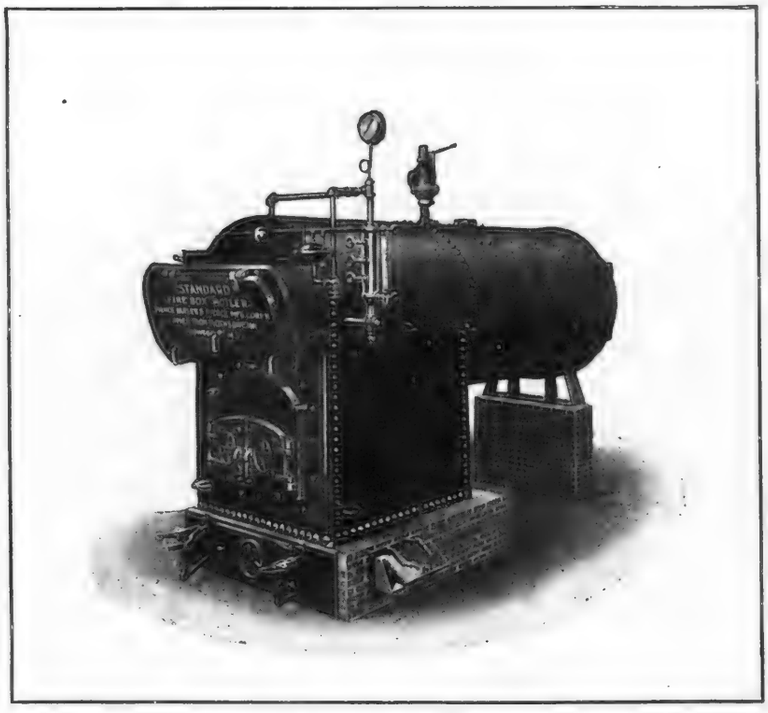
A Money Maker for you

Well rated concerns, or financially responsible individuals—who can sell to architects, heating contractors and building owners — can make money with this heating specialty. There is nothing like it—so it can't conflict with any line you may now handle. On the contrary, it will "round out" your work, and give you something to sell which has *made good wherever used.* Write us for particulars.

Wolff Coal Saver Co.

1336 West Congress St. **Chicago**

AMES



FIREBOX HEATING BOILERS

AMES IRON WORKS

Division of

PIERCE, BUTLER & PIERCE

MANUFACTURING CORPORATION

Main Office and Works

OSWEGO, N. Y.

General Sales Offices

41 EAST 42nd STREET, NEW YORK CITY

INTERNATIONAL HEATERS

Always Efficient— Because Easily Cleaned

ONE-EIGHTH of an inch of soot on any heating surface reduces its efficiency 28 per cent.

But the Economy Smokeless Boiler is easily cleaned. It can be kept at maximum efficiency without trouble.

Practically every square inch of surface in the Economy can be reached with a flue brush through the large clean-out doors in the *front.*

There are no deep corrugations or pockets in which soot can collect. There are no arms or water legs projecting down from the crown sheet where more soot could collect.

Operation and care of the Economy Smokeless Boiler is a *simple* matter. It does not require experienced firemen, nor special grades of fuel. At all times it is both "economy" and "smokeless."

And the International Guaranteed Radiation loads take the last bit of guess work out of boiler selection.

Congress Cigar Bldg., Philadelphia. Heated by two No. 210-S-47 Economy Smokeless Boilers. Harry F. Murphy Co., Inc., heating contractors; Isaac H. Francis, engineer; John N. Gill Construction Co., architects and general contractors.

Catalog 1751-H, giving all details, will be sent to any dealer or engineer on request.

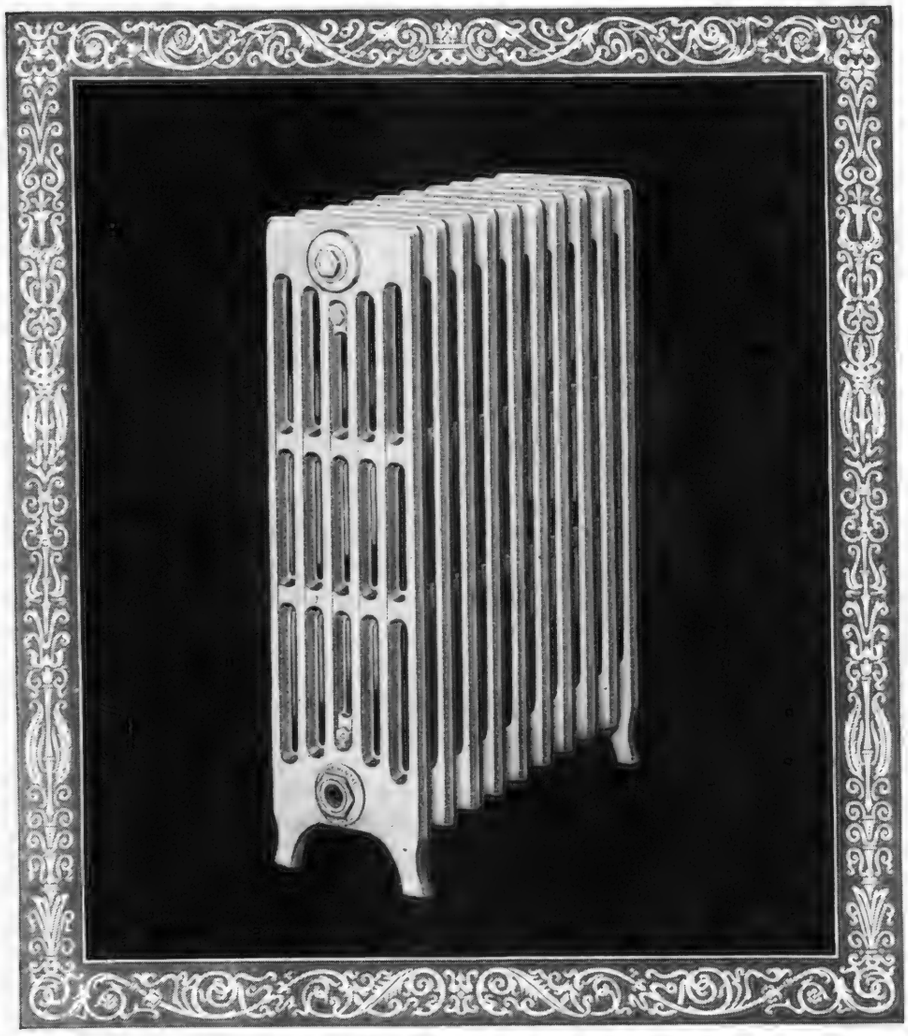
INTERNATIONAL HEATER COMPANY

Utica, N. Y.

Cleveland Chicago
Detroit Nashua, N.H.
New York City
Philadelphia

Canadian Distributor:—Heating Supplies Limited, 902 Home Street, Winnipeg, Manitoba.

ECONOMY SMOKELESS BOILERS



RADIATOR

THE NEW CONTINENTAL CLASSIC RADIATOR

Classic in Name—Classic in Appearance

The new Continental Classic Radiator is all that the name implies. It combines new beauty and new heating efficiency.

The open design of its tubes provides unusually free air circulation in addition to good interior circulation. It has full surface as rated, yet occupies considerable less floor space than standard radiators.

It is made in four and six tube sizes in four standard heights.

Advance photographs will give you a pleasing introduction to its beauty. May we send you copies?

Continental Heater Corporation
Home Office and Factory
Dunkirk, N. Y. U.S.A.

Why Waste Fuel?

Exterior View of Boiler Showing Air Inlet

The total amount of heat wasted in the form of smoke has been estimated at fifty millions of dollars a year. Smoke is composed largely of carbon, and the U. S. Bureau of Mines estimates that from 30% to 60% of the heat value of the fuel is contained in the smoke and gases distilled from soft coal. To allow them to escape unused up the flue means a serious waste of fuel and the money that pays for it. Utica - Imperial SUPER - SMOKELESS Boilers prevent this economic loss by burning the smoke and gases as fuel of remarkable heating value. The smoke nuisance is eliminated, health and cleanliness promoted, and every ton of coal burned is made to give out the maximum amount of heat.

UTICA—IMPERIAL

SUPER-SMOKELESS BOILERS

Manufactured by the

UTICA HEATER COMPANY, UTICA, N. Y.

"Pioneers in Smokeless Combustion"

Sales Offices in the Principal Cities

Spencer
steam, vapor or hot water Heaters

A size and type for every heating purpose and every kind of building

Spencer Junior Hot Water Heater—capacity in direct cast iron radiation equivalent, water, 300 to 600 square feet.

SPENCER HEATER COMPANY
WILLIAMSPORT, PA.

General Offices:

New York City Boston Philadelphia Baltimore Buffalo Rochester
Hartford Washington Detroit Albany Syracuse Harrisburg Scranton

Spencer No. 1 Single Grate Heater, capacity in direct cast iron radiation equivalent, water, 800 to 1450 square feet; steam or vapor, 500 to 900 square feet.

Spencer No. 2 Double Grate Heater, capacity in direct cast iron radiation equivalent, water, 1750 to 3800 square feet; steam, 1100 to 2350 square feet.

Spencer Tubular Steam Heater—15 to 21 Series—capacity in direct cast iron radiation equivalent—1900 to 3600 square feet.

Spencer Tubular Steam Heater—50 Series—capacity in direct cast iron radiation equivalent 4500 to 7000 square feet.

Left—Spencer Tubular Steam Heater—100 Series—capacity in direct cast iron radiation equivalent 7500 to 15000 square feet.

Right—Interior view showing construction principle.

All Spencer Heaters may be hooked up in battery where a flexible supply of heat is needed, or where the total radiation tax is greater than the capacity of a single boiler.

New York Central Motor Vehicle and Repair Shops, New York City. Designed and erected by Department of Plant and Structures, City of New York. Honorable Albert Goldman, Commissioner. Heating Contractor, Alvord & Swift. Blower Company, Ilg. Electric Ventilating Company.

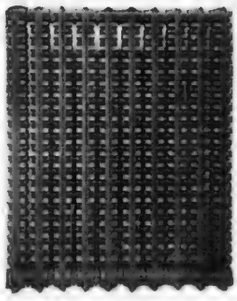
One of the largest heating jobs using VENTO in connection with Unit Heaters

17,737 square feet of Vento in connection with 73 Unit Heaters are used to heat this enormous building.

This is one of the largest installations of Vento in the United States in connection with Unit Heaters.

The installation was made because Vento Heaters have proved so dependable under every kind of test. They are permanent—do not wear out—do not leak, and withstand all the unusual conditions found in heating and ventilating, cooling, air washing, humidifying and drying processes.

We shall be glad to send you our "Engineers' Data Book on Vento," in which are tables showing the results of the most thorough tests ever applied to Blast Heaters.



A typical stack of Vento Cast Iron Heaters

AMERICAN RADIATOR COMPANY

Showrooms and sales offices: New York, Boston, Providence, New Haven, Newark, Philadelphia, Baltimore, Washington, Richmond, Buffalo, Pittsburgh, Cleveland, Detroit, Cincinnati, Atlanta, Chicago, Milwaukee, Indianapolis, St. Louis, St. Paul, Minneapolis, Omaha, Kansas City, Denver, San Francisco, Los Angeles, Seattle, Toronto, London, Paris, Milan, Brussels, Berlin

Makers of IDEAL BOILERS *and* AMERICAN RADIATORS *and other products for heating, ventilating and refrigeration*

SMOKELESS *by Actual* TEST

Photo of Chimney Smoking

Photo of Chimney 2½ minutes later

(From Cincinnati Times Star)

Maximum smoke of 60 per cent density came out of the stack of a new garage at Washington Ave. and Judge Street, when the boiler was being "hooked up" in a test made by Gordon D. Rowe, chief city smoke inspector, and M. Silbernagel, superintendent of the Smoke Abatement league, Tuesday. The test was being made on a new underdraft boiler. While the boiler was being fed heavily with soft coal, a partly dense smoke issued but one minute and a half. Then it grew into a lighter smoke of one minute duration, followed by a light haze. The boiler is the first of its kind installed in greater Cincinnati. It is based upon an up-draft and preheating principle. The test was attended by James A. Reilly and Tom Folger, coal dealers, Inspector Rowe, Silbernagel and others.

Several efforts were made to increase the smoke, but Rowe says the greatest density produced was about 60 per cent and this lasted little more than a minute. City ordinances say stacks can smoke six minutes an hour but after that, then it is violation of law.

CITY OF AKRON, OHIO

August 2nd, 1923

National Radiator Company
Johnstown, Pa.

Gentlemen:

Last March I had the privilege of visiting your plant at New Castle, Pa., and while there witnessed a test of your Smokeless Up-Draft Boiler. This boiler was fired according to my instructions, i. e.

A good level bed of live coals covering the entire grate surface was completely covered with green slack about two hundred and twenty (220) pounds being used. Air inlet damper was opened and stack was cleared to No. 1 Ringleman Chart in approximately one minute.

After about five minutes the fuel bed was stirred up with a slice bar and stack cleared in less than one and one-half minutes.

Every effort was made to cause boiler to smoke but with the use of air damper this was found impossible.

The efficiency of the boiler is extremely high as compared with others of similar type.

An inspection of castings showed them to be remarkably clean and smooth. The boiler is well constructed and each section is put to severe tests before being assembled.

The Department is not only interested in Smoke abatement but in the conservation of fuel and for these reasons, informs you of the result of its investigation.

This letter is unsolicited, but know you will be interested in the findings of the Department.

Yours very truly,

R. E. Dunlavy
CHIEF SMOKE INSPECTOR

City of Cincinnati

July 13th, 1923

GORDON D. ROWE
CHIEF SMOKE INSPECTOR

The National Radiator Co.,
Johnstown, Pa.

Gentlemen:

At a recent test of one of your #31-11b cast iron up draft smokeless boilers, held at Chas. Bicking's, Washington and Judge Sts., Norwood, Ohio, it was thoroughly demonstrated that your boiler meets with all the requirements of the Cincinnati anti smoke code, and permits for the installation of such boilers in the City of Cincinnati will be allowed by this department.

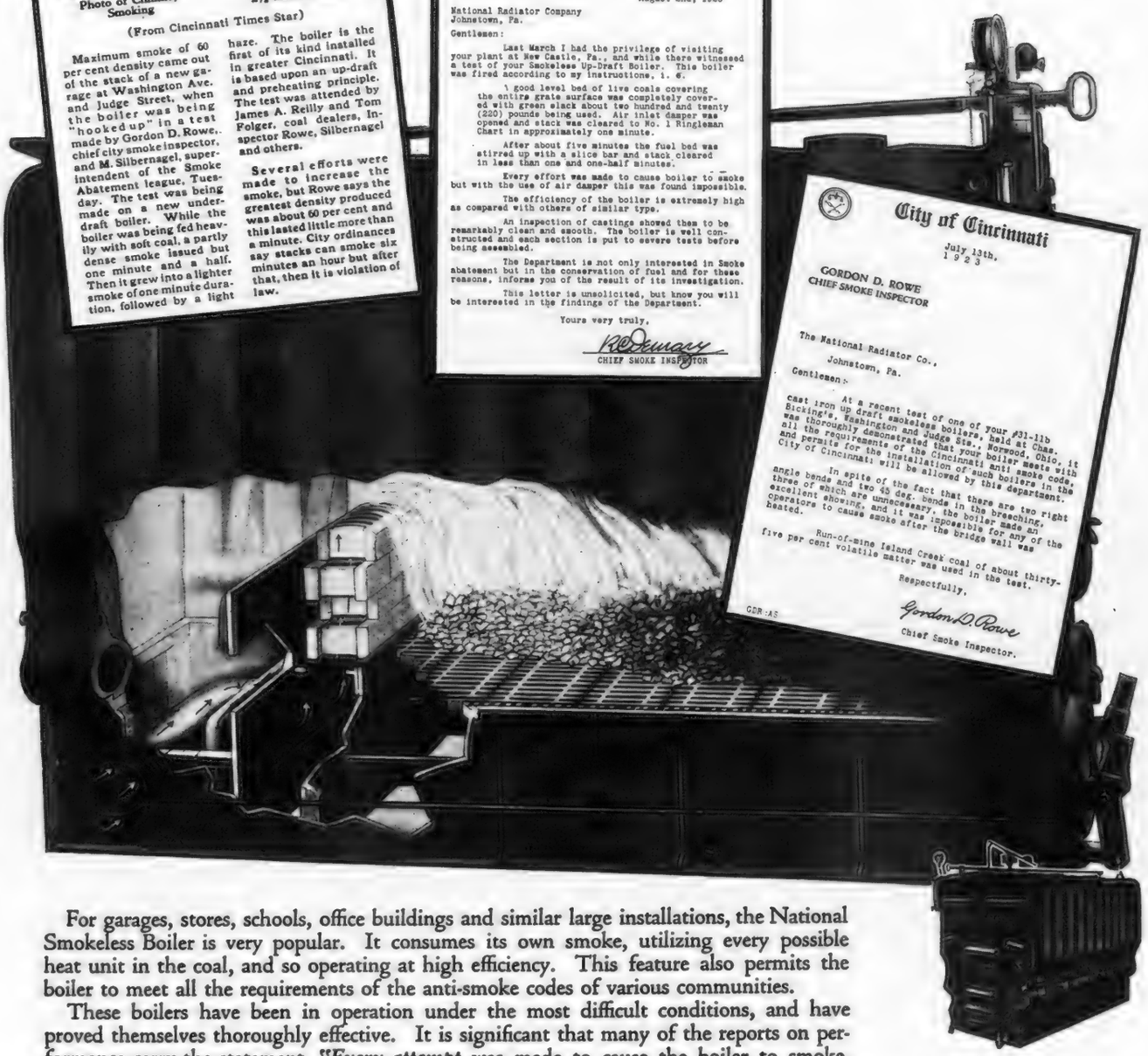
In spite of the fact that there are two right angle bends and two 45 deg. bends in the breeching, three of which are unnecessary, the boiler made an excellent showing, and it was impossible for any of the operators to cause smoke after the bridge wall was heated.

Run-of-mine Island Creek coal of about thirty-five per cent volatile matter was used in the test.

Respectfully,

Gordon D. Rowe
Chief Smoke Inspector.

GDR:AS



For garages, stores, schools, office buildings and similar large installations, the National Smokeless Boiler is very popular. It consumes its own smoke, utilizing every possible heat unit in the coal, and so operating at high efficiency. This feature also permits the boiler to meet all the requirements of the anti-smoke codes of various communities.

These boilers have been in operation under the most difficult conditions, and have proved themselves thoroughly effective. It is significant that many of the reports on performance carry the statement, *"Every attempt* was made to cause the boiler to smoke, *but all were unsuccessful."*

Literature and discount sheets on request.

NATIONAL RADIATOR COMPANY

JOHNSTOWN, PA.

PLANTS: Johnstown, Pa. New Castle, Pa. Trenton, N. J.
BRANCH OFFICES: New York, Philadelphia, Baltimore, Washington, Richmond, Pittsburgh, Cincinnati, Cleveland and Chicago

NATIONAL SMOKELESS BOILERS

CONFORM WITH SMOKE CODES EVERYWHERE

Titusville Boilers in these Modern Riverside Drive Apartments

In these ultra-modern apartments, where only the finest equipment was used—it was only natural that Tico Horizontal Tubular Boilers should be installed.

The apartments illustrated are located at 839 to 845 Riverside Drive, New York City, and were erected by Friedman and White Company,—the owners. The heating contract was directed by the Lee Heating Company.

THE TITUSVILLE IRON WORKS CO.

TITUSVILLE PENNA.

SALES OFFICES

New York
152 West 42nd Street

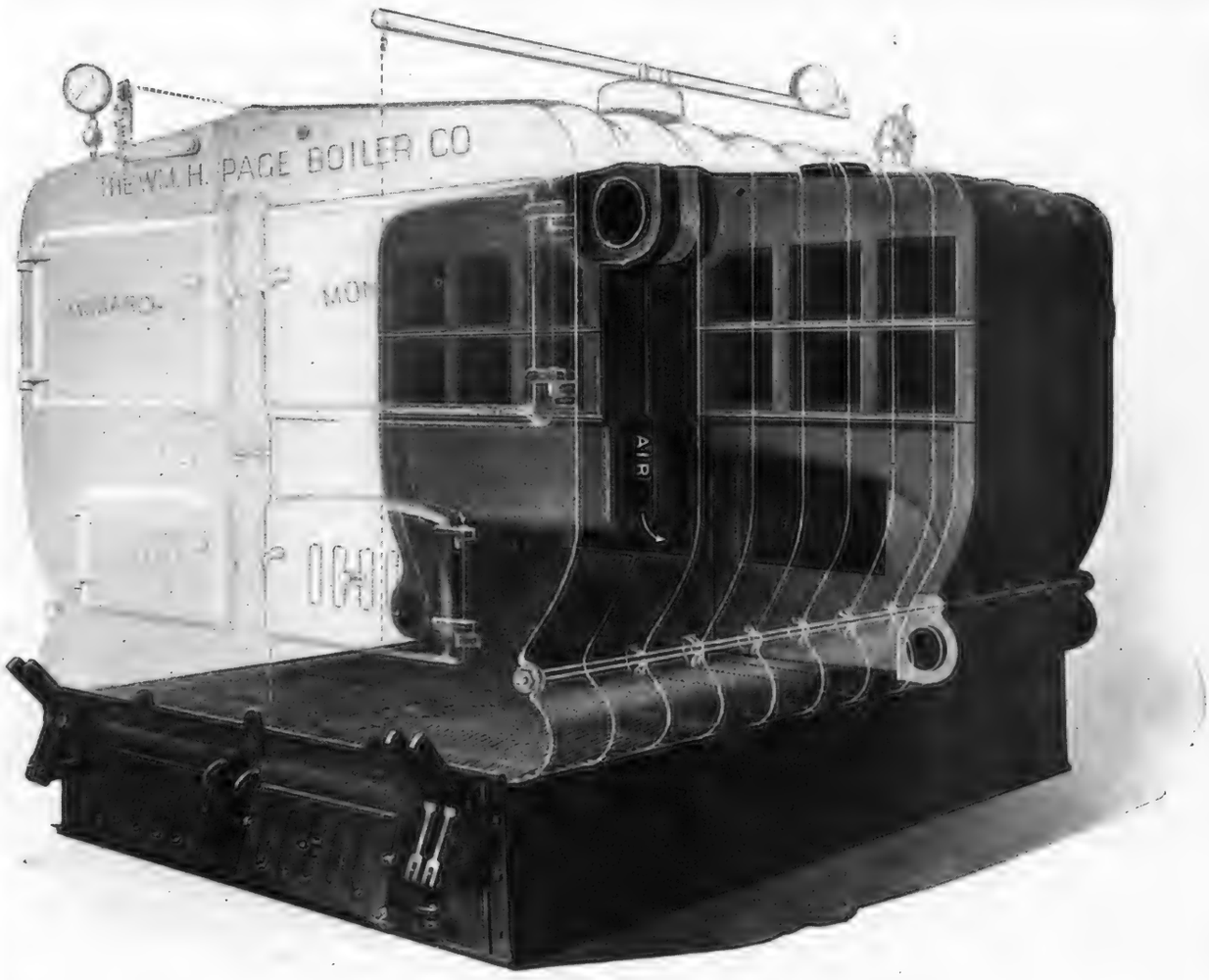
Pittsburgh, Pa.
Farmers Bank Bldg.

Buffalo, N. Y.
Marine Trust Bldg.

Chicago, Ill.
1124 Harris Trust Bldg.

Detroit, Mich.
833 Washington Blvd. Bldg.

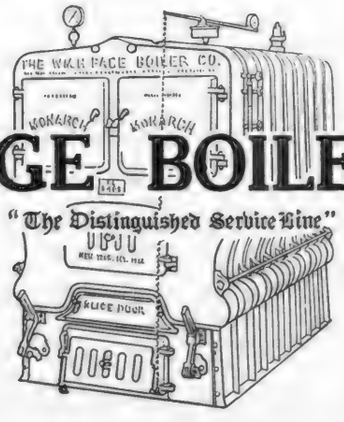
Washington, D. C.
Woodward Building



Monarch 60" Smokeless Boilers, designed for heating of schools, churches, banks, industrial and office buildings, are peculiarly suited by the arrangement of fire travel, and large areas of heating surface in proportion to grate, to perform their function with a high degree of efficiency, and economy—burning any available fuel, including oil.

A recent installation of two Monarch boilers, to heat six buildings, in which buckwheat coal was burned, over force draft grates, has saved the owners more than 50% of their previous fuel cost, said cost being established by averaging the fuel costs of the preceding three years.

Catalogue No. 52 will give you complete specifications, and will be mailed upon request.



PAGE BOILERS

THE WM. H. PAGE BOILER CO.

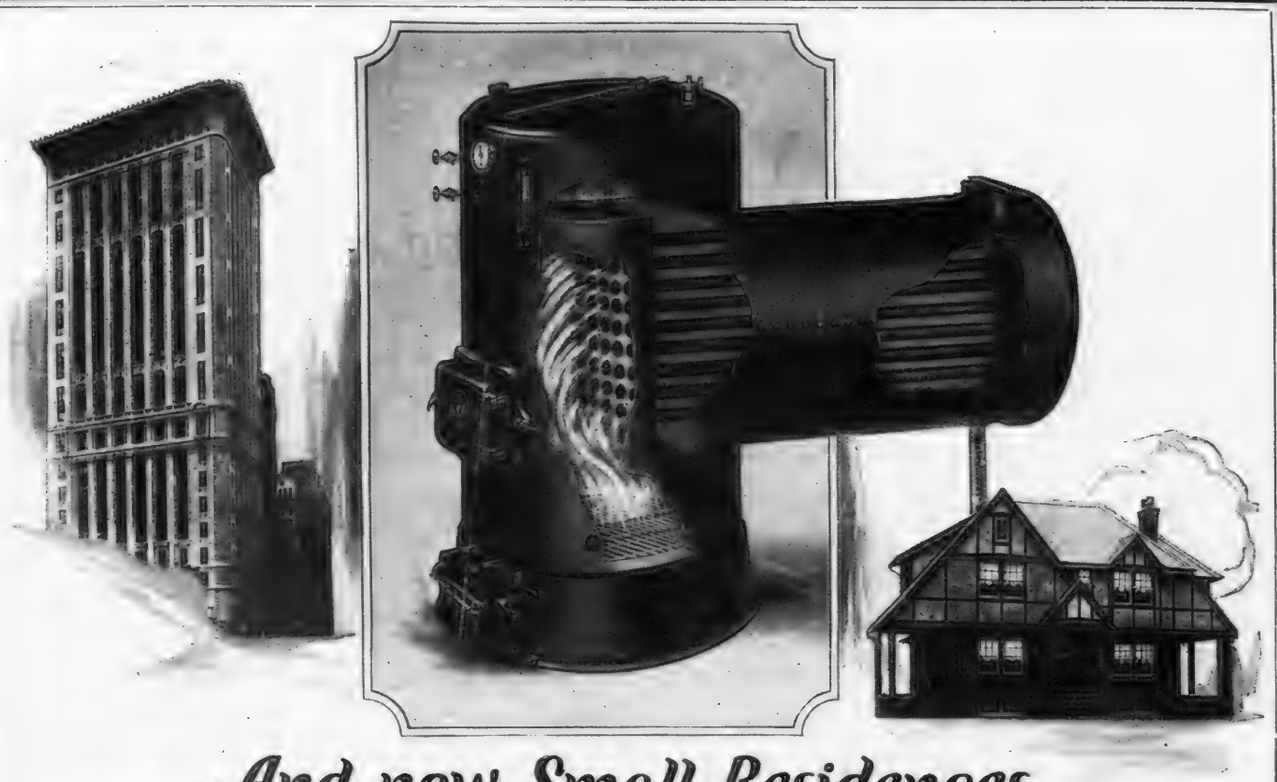
200 Madison Avenue

NEW YORK

BOSTON
PHILADELPHIA

CLEVELAND
MEADVILLE

Established 1856 **Incorporated 1876**



And now Small Residences can be heated as cheaply and efficiently as Giant Office Buildings

No longer is it necessary to be satisfied with higher heating costs and less efficiency in residences and SMALL buildings than you have received from Fitzgibbons Steel Boilers in *large* buildings during the past forty years. For now the Fitzgibbons may be had in sizes small enough for any building at prices that compare favorably with cast-iron boilers.

In the small Fitzgibbons-Ontario Copper-Steel Boilers will be found the same tried and proven design and features that have made the big Fitzgibbons Boilers outperform all other boilers.

We can point to Fitzgibbons Steel Boilers galore that have been in continuous use in many of the world's finest buildings for thirty-five years or more, and that are still in active service and in good condition.

Fitzgibbons Super Features

1. Effect fuel savings of about 40%.
2. Require little floor space.
3. Are exceptionally easy to fire.
4. Heating surfaces can be cleaned in 5 minutes.
5. Cost practically nothing for upkeep.
6. Made of rust-resisting copper-steel.
7. Are the lowest priced boilers to insure.
8. Made in one piece—nothing to assemble—no joints to putty.
9. Built in accordance with A.S.M.E. Boiler Codes.
10. Ratings are NET and give the amount of equivalent cast-iron radiation that the boiler will heat.

If you will compare the Fitzgibbons - Ontario Copper-Steel Boiler, point by point, with every other make, we are certain you will reach but one conclusion—that it offers a value that is absolutely beyond equal in the boiler industry.

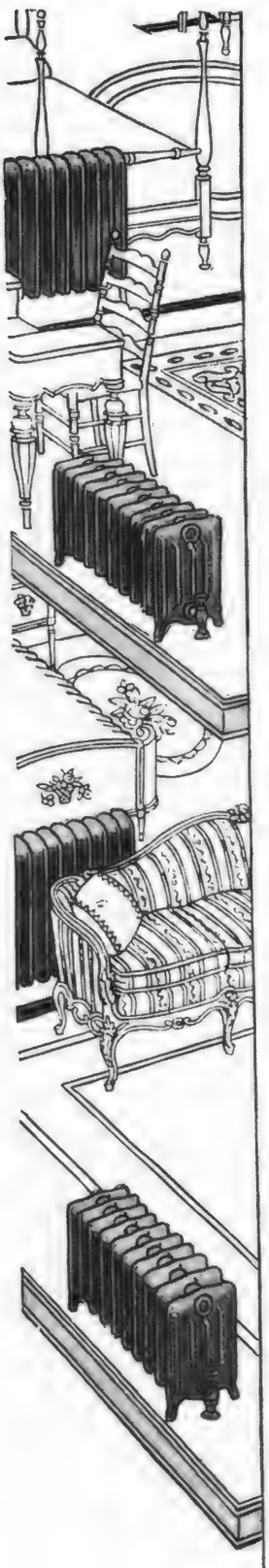
These boilers are available in 400 to 3200 sq. ft. capacities. Other sizes up to 36,000 sq. ft. All sizes are made for steam, vapor and hot water, and burn oil or any kind or size of coal.

Write for booklet before you forget it.

Fitzgibbons Boiler Co., Inc.
570 Seventh Ave., New York City
Representatives in Principal Cities

Fitzgibbons
COPPER-STEEL BOILERS

DEPENDABLE HEAT ALL OVER THE HOUSE WITH ECONOMY



YOU
and guaranteed heating are both being advertised

Just as Capitol boilers are specifically guaranteed in writing as to the amount of radiation that each will satisfactorily heat, so Capitol national publicity specifically advertises you, the contractor.

Not in general terms, not by vague references, but definitely and directly an entire advertisement tells millions of prospective heating clients about your good work.

See this striking, good-will building page in the August issue of the following magazines: American, Country Life, House Beautiful, and B'nai B'rith.

Your request for complete information about Capitol guaranteed heating and the Capitol line will be promptly answered.

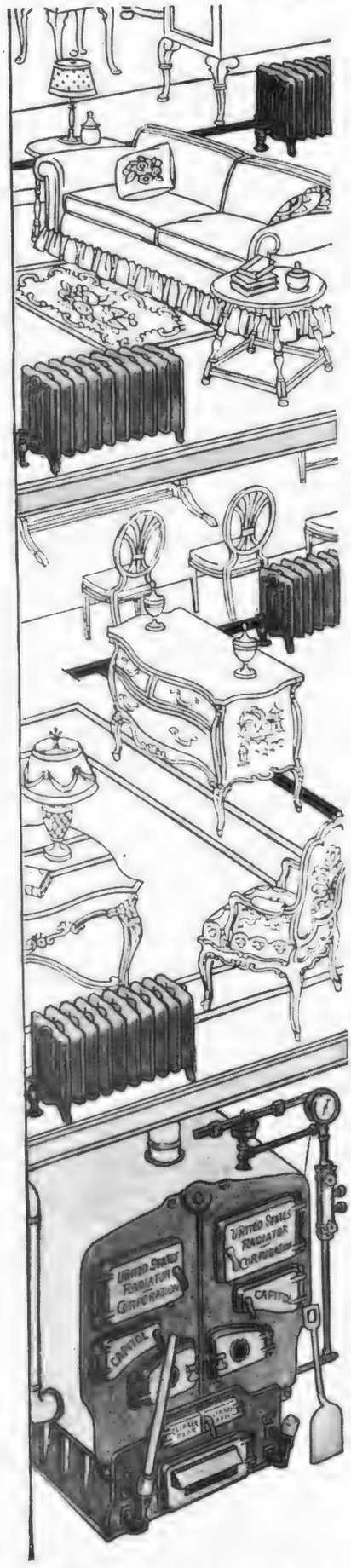
UNITED STATES RADIATOR CORPORATION

Detroit, Michigan

6 FACTORIES AND 28 ASSEMBLING PLANTS SERVE THE COUNTRY

For 36 years, builders of dependable heating equipment

Capitol Boilers
and
UNITED STATES RADIATORS



SUPPLIED AND INSTALLED NATIONALLY BY ESTABLISHED HEATING CONTRACTORS

The Successor to the Radiator

It's There — But Where?

IT'S there — but where? In this room equipped with the remarkable, new Trane Heat Cabinet, you see nothing to interfere with artistic decoration. Still a unit is there that will provide greater heating comfort than any radiator, do it more economically and serve the life-time of the building without care or attention.

Heats by Convection

The Trane Heat Cabinet, successor to the radiator, embodies a new application of accepted heating principles. It heats quicker, permits perfect control of room heating, is economical on fuel.

The heating element, which gives off heat freely by convection, is a U-tube with closely spaced copper sheets attached by a special Trane Process which makes them an integral part of the tube.

Natural Circulation

Air when heated becomes lighter and rises. The Trane Heat Cabinet utilizes this natural law of air circulation. Cool air near the floor flows in at the bottom of the Cabinet, is heated as it passes between the copper sheets, circulates up through the Cabinet and out into the room. The heated air gains a velocity of as high as 100 feet per minute without aid of fans. Insures very quick heating.

Each Cabinet is equipped with a damper, which gives instantaneous control of room heating. Stop air circulation by closing the damper and room heating stops. The heating element stays hot. When the damper is opened again, heating of air starts immediately.

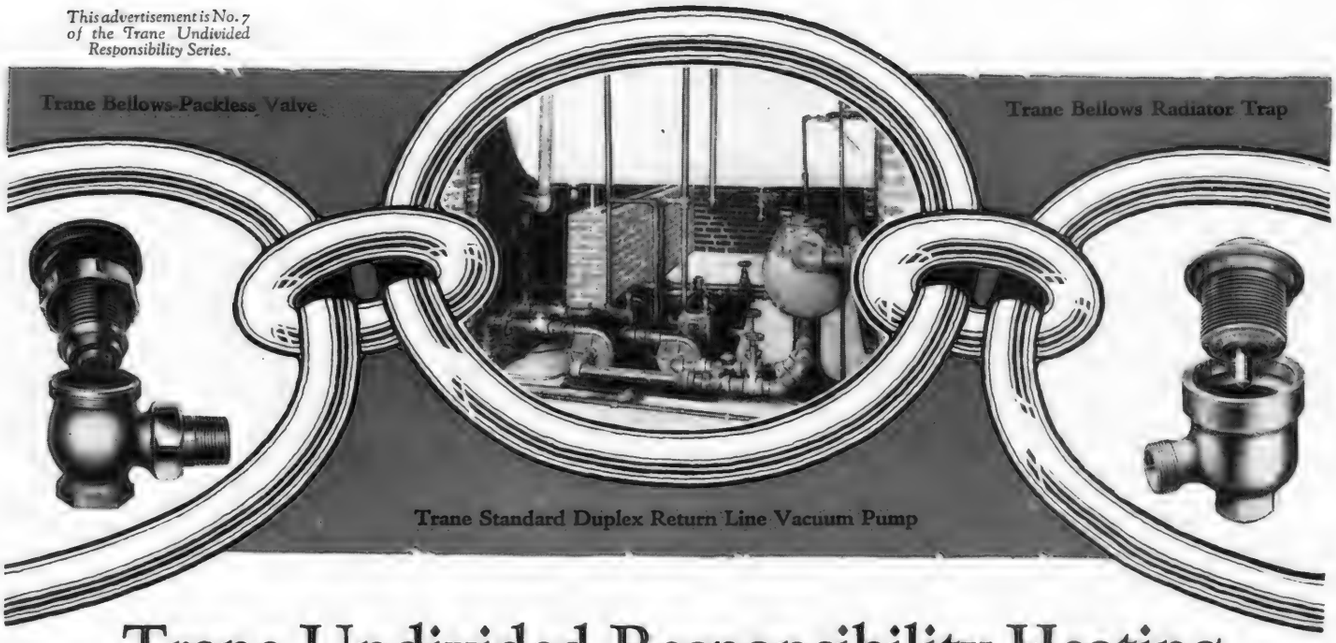
For Steam, Hot Water, Vapor, Vacuum Systems

Trane engineers have applied only approved heating principles in building Heat Cabinets. Ratings have been accurately determined on all sizes of Trane Heating Elements. Trane Heat Cabinets, concealed, and visible types which have attractive metal cases, are built for rooms of all sizes. They will serve anywhere the ordinary cast iron radiator is used. For steam, hot water, vapor, vacuum systems. Light, easy to install. Moderately priced. Write today for complete information.

TRANE HEAT CABINETS

THE TRANE COMPANY, *Est.* 1885, LA CROSSE, WISCONSIN

This advertisement is No. 7 of the Trane Undivided Responsibility Series.



Trane Undivided Responsibility Heating in the Willetts Apartments, New York

"ON the world's most splendid residential street," Park Avenue, New York City, is this 100% Trane installation. The building is the beautiful, 16-story Willetts Apartments.

This installation is further evidence of the high position Trane Pumps, Trane Heating Specialties and the Trane policy of Undivided Responsibility hold with those who specify heating equipment for the type of buildings where there can be no compromise on heating satisfaction.

The Willetts Apartments. Douglas L. Elliman & Co. managing agents of the Willetts Apts. Location, Northeast corner 59th St., New York City. Architect Geo. B. Pelham, New York. Heating Contractors, P. F. Yockel & Sons, Inc. New York.

The Trane units used for this installation which has 500 radiators, 20,000 square feet of radiation, include:

530 Trane Bellows Traps, 500 Trane Bellows Packless Valves, 1 Trane Standard Duplex Return Line Vacuum Pump, Capacity 40,000 Square Feet.

Specifying 100% Trane equipment amounts to specifying complete satisfaction. Every unit is fully guaranteed. And the perfect operation of the complete job is insured through Trane Undivided Responsibility. A great combination—and offered exclusively by Trane.

TRANE HEATING SPECIALTIES AND PUMPS

The Trane Company, 000 Cameron Ave., La Crosse, Wis., manufacturers of vapor and vacuum heating specialties and pumps. Branches and sales connections at New York, Chicago, Boston, Cincinnati, Newark, Philadelphia, Buffalo, Cleveland, Detroit, Seattle, Los Angeles, Albany, Minneapolis, Salt Lake City, Greensboro, N. C., Zanesville, O., Tampa, Fla., Baltimore, Md., Des Moines, Ia., New Haven, Conn., Sheboygan, Wis. In England: 22-23 Clerkenwell Close, London, E. C. 1. In Canada: The Trane Co., 23 River St., Toronto, 2; Thomas Robertson & Co., 134 Craig St., West, Montreal; F. S. Murdoch, 310 Breadalbane, Winnipeg; A. B. Madden, 48 Sparks St., Ottawa. In Japan: The Uchida Trading Co., Ltd., Tokio-Osaka-Kobe. In China: C. J. Doughty & Co., 7 Jinkee Road, Shanghai.

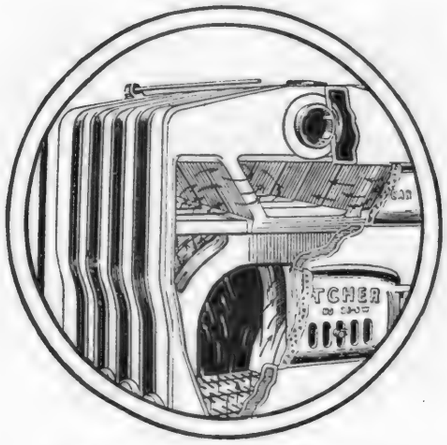


Diagram showing the principle of "Triple Fire Travel"

MORE HEAT—LESS COAL

YOUR CUSTOMER will realize when you have explained to him the construction of the Thatcher Sectional Boiler with the aid of this diagram, that the principle of Triple Fire Travel means more heat from every pound of coal he buys.

Because this Triple Fire Travel eliminates waste by getting all the heat value out of the smoke and hot gases which usually escape up the smoke-pipe before they have done any work.

WHEN you have a large piece of heating work for a particular customer, the most dependable plant you can offer him is a

THATCHER SECTIONAL BOILER

In addition to its Triple Fire Travel over an unusually large heating surface, which makes it exceedingly economical, it is easily operated, and sure to give satisfaction when installed.

Its particularly wide feed door allows the use of a good-sized shovel in firing; its deep combustion chamber permits the complete combustion of every pound of coal; its easily operated grates, of heavy crown top pattern, are suited to any size of anthracite, soft or pea coal. And its convenience of installation is a point well worth considering.

Mail the coupon for full information regarding the Thatcher Sectional and our full line of Boilers, Furnaces and Ranges.

THE THATCHER COMPANY

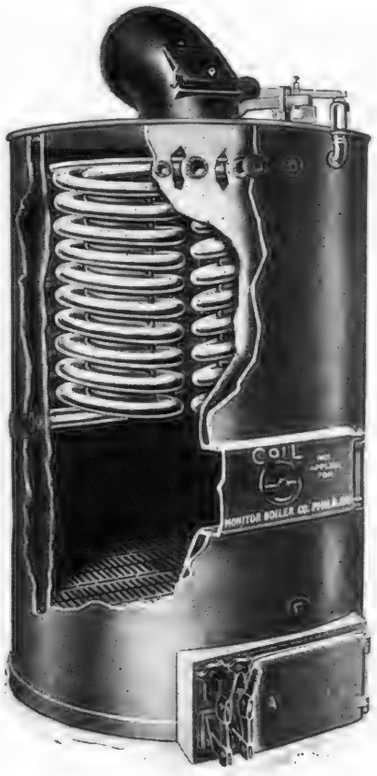
formerly Thatcher Furnace Co.

Since 1850

Newark, N. J.—39-41 St. Francis St.
Chicago—341 N. Clark St.
New York—21 W. 44th St.

THE THATCHER COMPANY—39-41 St. Francis St., Newark, N. J.
Gentlemen:—Send me information regarding the Thatcher Sectional Boiler.
Name .....
Address .....

THATCHER
BOILERS-FURNACES-RANGES



Cut Down Your Oil Bill with

COIL

STEEL HEATING BOILERS

AND

WATER HEATERS

Large combustion chamber, fast circulation of water through coils and shell. The coils and shell not only get the benefit of the radiant heat, but, as heat rises through coils it must pass (or sift) outwards through and over the coils to the shell before reaching draft spaces at edge of baffle which lays flat on coils. Because of the large amount of heating surface the heat must pass through and over, unusually low flue temperatures are obtained.

Write for interesting testimonials showing savings in (oil and coal) running from 25% to 40%.

MONITOR BOILER COMPANY

1505 Race Street, PHILADELPHIA, PA.

The Real Test of a Boiler

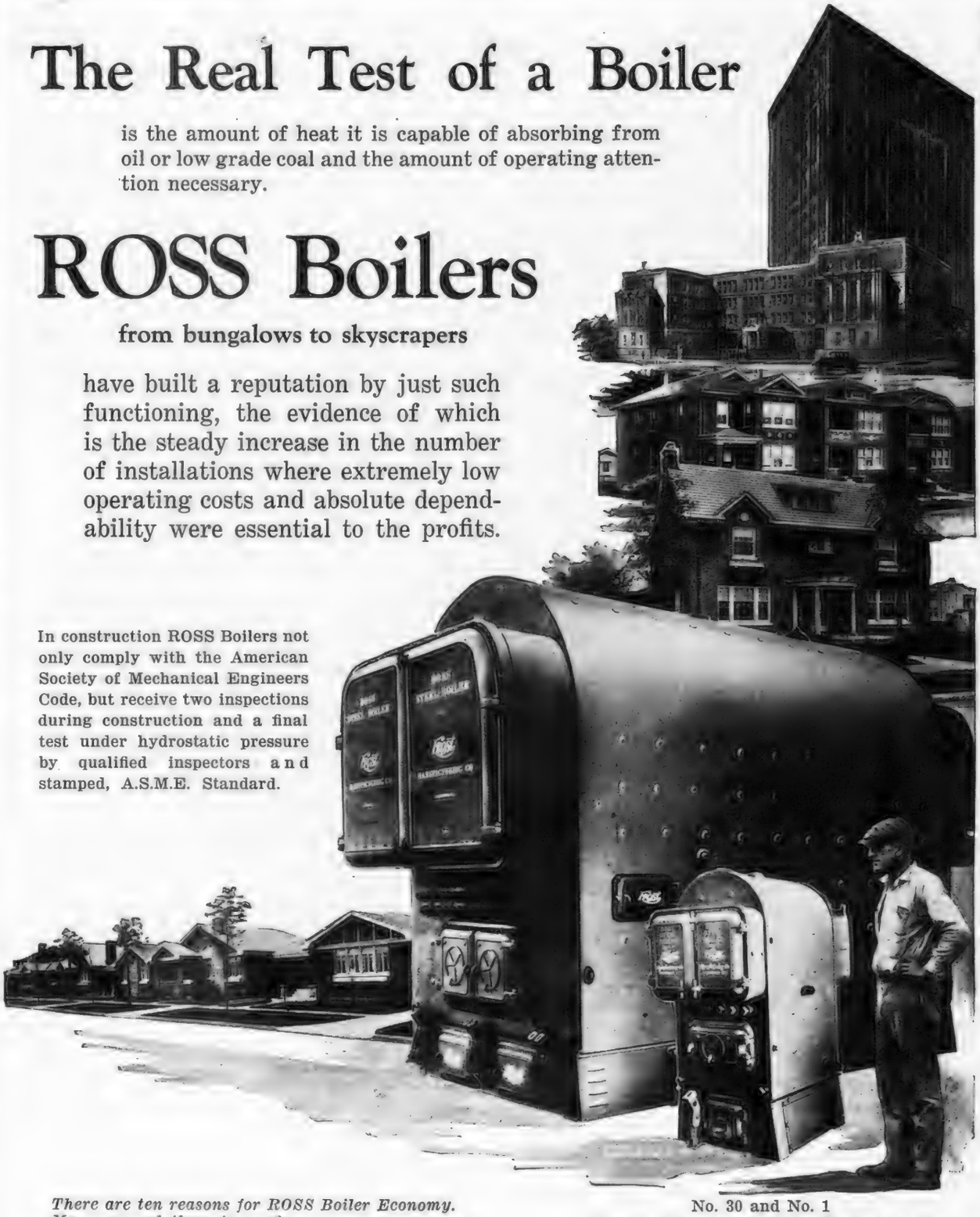
is the amount of heat it is capable of absorbing from oil or low grade coal and the amount of operating attention necessary.

ROSS Boilers

from bungalows to skyscrapers

have built a reputation by just such functioning, the evidence of which is the steady increase in the number of installations where extremely low operating costs and absolute dependability were essential to the profits.

In construction ROSS Boilers not only comply with the American Society of Mechanical Engineers Code, but receive two inspections during construction and a final test under hydrostatic pressure by qualified inspectors and stamped, A.S.M.E. Standard.



There are ten reasons for ROSS Boiler Economy. May we send them to you?

No. 30 and No. 1
Ross Boilers are made in 30 sizes with capacities from 400 to 27000 square feet.

The FROST Manufacturing Co.

SINCE 1851

MAIN OFFICE AND WORKS 1520 HENDERSON STREET, GALESBURG, ILLINOIS

In America's Foremost Banks

A check-up on modern buildings in the larger cities will usually show that the piping specifications for America's Foremost Banks read: "NATIONAL"—The Recognized Standard of Wrought Pipe—the only pipe that is Spellerized (sizes 4-inch and under) and made Scale Free (butt-weld sizes ½ to 3-inch). Both the Spellerizing and Scale Free processes were invented and developed by National Tube Company and are applied exclusively to "NATIONAL" Pipe. This means pipe that is made under the most approved and ideal conditions to render a long and satisfactory service. Architects and Engineers can best safeguard their clients' interests by specifying "NATIONAL." Made by the largest manufacturer of wrought pipe in the world. Ask for Bulletin No. 25.

NATIONAL TUBE COMPANY, PITTSBURGH, PA.

GENERAL SALES OFFICES: FRICK BUILDING

DISTRICT SALES OFFICES

Atlanta Boston Chicago Denver Detroit New Orleans New York Salt Lake City Philadelphia Pittsburgh St. Louis St. Paul

Pacific Coast Representatives: U. S. Steel Products Co. San Francisco Los Angeles Portland Seattle

Export Representatives: U. S. Steel Products Co. New York City

Re: 33% fuel saving with PULVERZONE

"Turbulence before, at and after ignition"—results in huge overload capacity, smokelessness, high efficiency and rapid response.

SMALL PARTICLES OF COAL BURNED IN SUSPENSION
PULVERIZED COAL FIRE ZONE
AUTOMATIC DISTRIBUTION OF COAL BY WEIGHT
CONTROLLED AIR
ACCESS OR REFUSE FIRING DOORS
LEVERS USED ONLY TO ADVANCE AND BREAK UP FUEL BED TO INCREASE RATE OF COMBUSTION
LARGE LUMPS
GASES
SMALL LUMPS
POROUS FUEL BED
ZONED EQUALIZED DRAFT ON WHOLE LENGTH OF STOKER BY AUTOMATIC SIZED SEPARATION AND REMOVAL OF ALL FINES

"absolutely smokeless..... with cheapest coal we can buy"

Says one user. He says, further:

> "We cannot speak too highly of the Pulverzone. We are burning coal at $4.50 per ton—the cheapest coal we can buy—where we used to use $7.00 coal before installing the Pulverzone.
>
> "The Pulverzone is smokeless, even with our cheap coal. We have not had a single notice from the Smoke Department since putting it in, whereas we used to receive smoke notices every few days and were often threatened with shut down.
>
> "We are saving 33% on our fuel bill ..... now obtain as much power as we want and no longer have any trouble due to low steam pressure drop. You certainly should put in the Pulverzone and use the cheapest coals you can buy."

The Pulverzone is superior to all other coal burning apparatus. It is revolutionizing coal burning wherever installed—in small, medium sized and large plant alike. It combines THREE methods in ONE, embodying the best elements of

1—PULVERIZED COAL BURNING
Instantaneous ignition of the fine particles in suspension without danger of explosion

2—SPREAD METHOD
(Light and Continuous) by automatically separating, grading and distributing of coal sizes by weight

3—COKING METHOD
The Standard CoKal Stoker fuel bed provides the intense heat necessary for burning the fines and the spread coal

Ask for full particulars.

What do these 11 features mean to you?

1 Absolutely Smokeless.
2 Huge overloads.
3 Eliminates all Cleaning Periods.
4 Abnormally High Efficiencies.
5 Instantaneous Response to Load Changes.
6 Perfect Combustion.
7 No Pulverizing Necessary.
8 Uses Standard Screenings (wet or dry).
9 No Slagging.
10 Fires Can Be Banked.
11 No Explosion Hazard.

All boilers from 100 to 2000 bhp. can quickly and easily be equipped with PULVERZONE.

CoKal Stoker Corporation

1014 Wrigley Building, Chicago

Buffalo Kansas City New York City Philadelphia Pittsburgh St. Louis

S.T. Johnson Co. Oil Burners are heating hundreds of homes from Maine to California, efficiently, safely, economically.

The CONFIDENCE Of the Trade...

JOHNSON OIL BURNERS©

"Built Like a Watch"

For 21 years, Oil Burning Equipment manufactured by the S. T. Johnson Co. has held the respect and confidence of "the Trade." Engineers praise the Johnson Rotary for:

1. ***Dependability.*** Correct design, finest materials and precision methods of manufacture.
2. ***Simplicity.*** Compactness and accessibility.
3. ***Economy.*** Burns low-grade oil fuel with high efficiency.
4. ***Safety.*** The Johnson Rotary Burner with full automatic control is listed as standard by Underwriters' Laboratories, an organization established and maintained by the National Board of Fire Underwriters.

Some valuable territory still available for a few desirable dealers. Write for illustrated booklet and full information.

Factory Branch Offices:
San Francisco
Sacramento
Philadelphia

S. T. JOHNSON CO.
OIL BURNERS
TRADE MARK REGISTERED

Distributors and Dealers Throughout the United States and in Foreign Countries

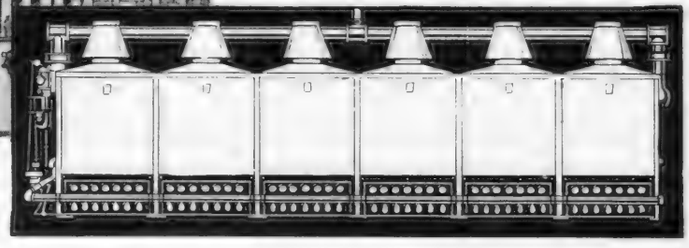
Main Office and Factory ~ 940-950 Arlington Avenue
OAKLAND, CALIFORNIA

42-926

World's Largest Gas Boiler Installation

The new building for the Boston Consolidated Gas Company, requiring 48,000 square feet of boiler capacity, will be heated by gas. Six Type 4-G 22 Ideal Gas Boilers have been selected for this job. When completed, it will be the largest gas boiler installation in the world. Parker, Thomas and Rice are the Architects.

Six Ideal Type 4-G 22 section Gas Boilers, installed in battery, will heat the Boston Consolidated's new home.



A battery of IDEAL Gas Boilers will heat this new building

Large buildings can now be efficiently heated by gas. A new ideal Gas Boiler, especially designed for large installations, has made this practical.

Ideal Gas Boilers for small buildings as well as larger ones can help you solve a number of problems.

They are compact. They are automatic in operation. They are clean. They are noiseless. They require no fuel storage tanks or bins.

To your clients who desire the best in heating, you can offer these advantages and more through Ideal Gas Boilers—a product of the American Radiator Company.

We will be glad to send you for your files complete information on central fired gas heating systems, if you will write to us.

IDEAL GAS BOILERS

Product of AMERICAN RADIATOR COMPANY

AMERICAN GAS PRODUCTS CORPORATION

376 Lafayette Street DISTRIBUTOR New York City

SALES OFFICES: BOSTON BUFFALO PHILADELPHIA JACKSONVILLE CHICAGO ST. LOUIS KANSAS CITY SAN FRANCISCO

Success is the Rule with Electrol Dealers

The Electrol Oil Burner is backed by a Liberal Sales Policy and a progressive company that is helping dealers to Success!

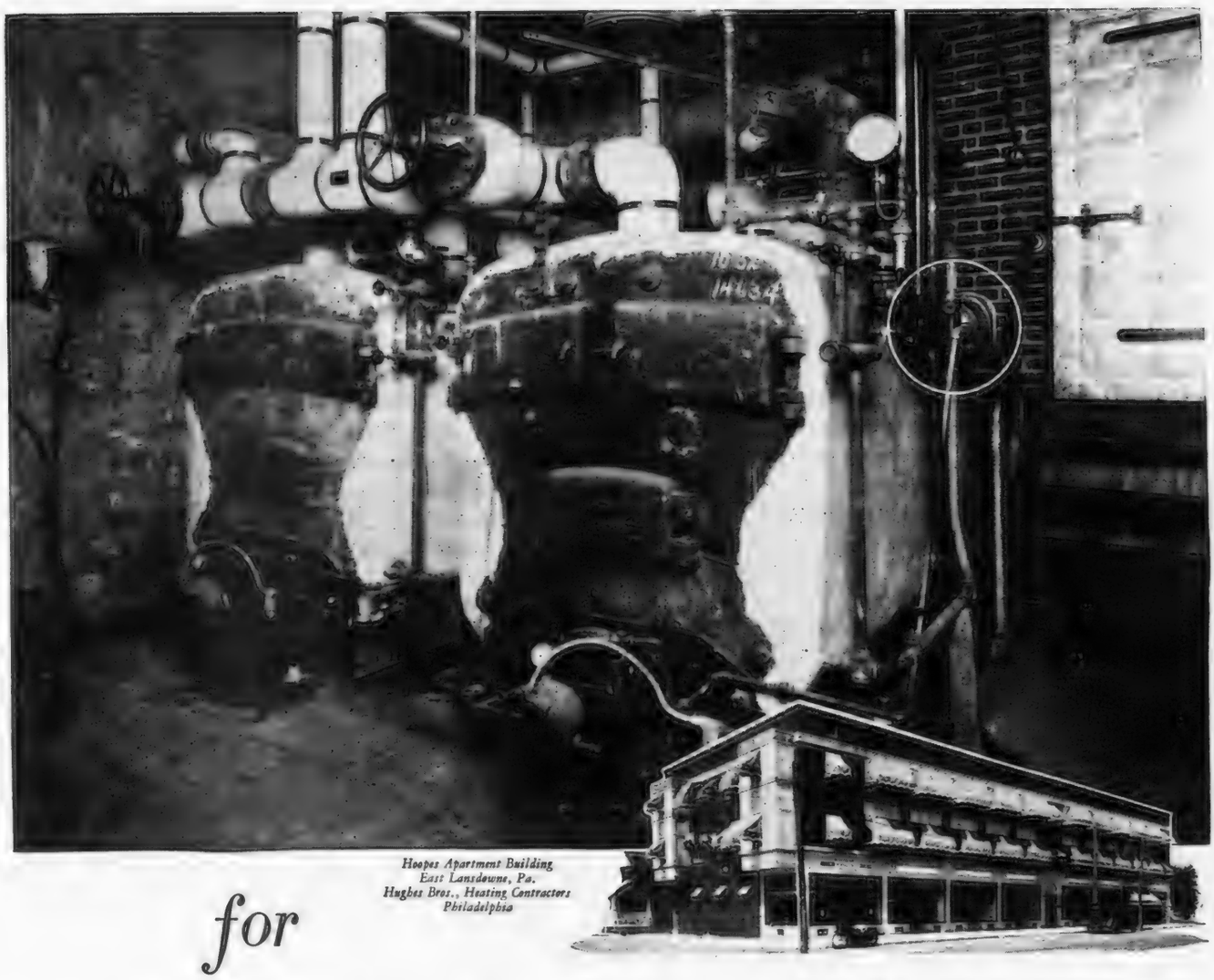
An All-Electric—All-Modern—All-Automatic oil burner. Engineered and manufactured by pioneers in the industry.

Extremely low servicing average safeguards your profits!

Comprehensive National Advertising in *The Saturday Evening Post* and *Literary Digest.*

Maximum factory co-operation. A genuine understanding of dealers' needs. Write for details of the valuable Electrol Sales Proposition. Your territory may be open!

ELECTROL
INCORPORATED
OF MISSOURI
SAINT LOUIS, U. S. A.



Hoopes Apartment Building
East Lansdowne, Pa.
Hughes Bros., Heating Contractors
Philadelphia

for

Apartments and Stores

A janitor has to be a sort of "jack-of-all-trades." He shovels snow, he's first aid for leaky faucets and plugged drains, he's fireman and chief engineer.

It's no wonder that sometimes he forgets something. If it's the snow that he forgets, it's not so serious, but if it's his boiler water line—then there's trouble.

The McDonnell & Miller Duplex Water Feeder never forgets. It has only one job, and that's to control the boiler water line.

If the boiler needs water the Duplex Feeder automatically supplies it. If too much condensate is returned from the system, the Duplex Feeder prevents flooding by disposing of the excess.

Keep the boiler water line always where it belongs and there can be no burned boilers or cracked sections.

ASK FOR OUR BULLETIN H-10.

McDonnell & Miller

BOILER CONTROLS

General Offices • WRIGLEY BUILDING • CHICAGO ~ Warehouse Stock • BUSH TERMINAL • BROOKLYN

RAYFIELD

PATENTS PENDING

Automatic Fuel Oil Burners

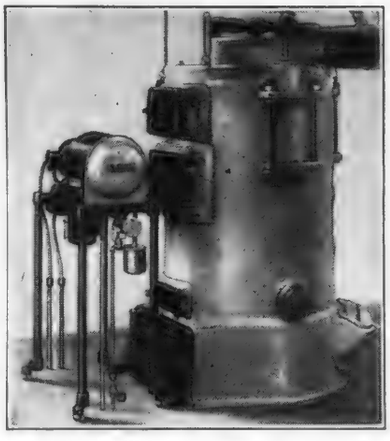
Note These Important Features

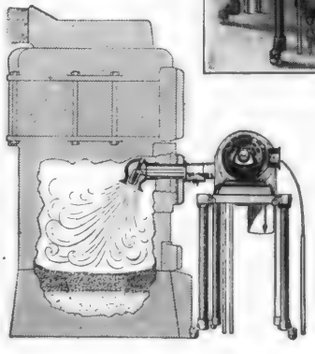
1. Utilizes the Radiant Heat Principle.
2. Positive Electric Ignition.
3. Air-cooled, Non-carbonizing Nozzle.
4. Triple Atomization.
5. Double-Length Flame Travel.
6. No Baffling Walls.
7. Really Quiet (not maybe).
8. Rayfield Flame Safety.
9. Latest Minneapolis Controls.
10. Complete Line—5 sizes.
11. Burns Fuel Oil—28/30 For Homes: Lower Gravities for Factories.

Rayfield's Scientific Combustion

Note the illustration. The nozzle is suspended over the fire pot. The vapor, burning in suspension, is forced directly downward to the crushed fire brick at the bottom, then deflected to the sides and rises evenly along the walls of the fire box before the generated heat escapes through the flue. In this manner the flame travels twice the usual distance in the fire box, giving off the maximum heat at the bottom of the fire box and completing combustion before reaching the flue.

The Radiant Heat principle is utilized through the bed of crushed fire brick placed in the ash pit. In operation this brick quickly becomes incandescent, absorbing and holding the heat that would otherwise be lost up the chimney. Long after the burner has been shut off by the thermostat, this white-hot bed of crushed brick continues to radiate its stored heat and thus assists in maintaining an even temperature throughout the building.





The Rayfield is a Super-system of heating designed and developed by Chas. L. Rayfield, inventor of the well-known Rayfield Carburetor for automobiles, and an acknowledged authority on the combustion of liquid fuels.

Built by Engineers—Approved by Men Who Know the Heating Business

Heating plant engineers, manufacturers and oil-burner men quickly approve the Rayfield after inspection and testing.

These men came to see what we have. Some of them were open-minded, some were not. They witnessed demonstrations, inspected burners in operation, talked to users and made tests under their own conditions.

As a result of their observations they report that the Rayfield is:

—a simple and quiet power burner

—correct from an engineering standpoint

—equipped with remarkable safety controls.

You are invited to make a similar investigation of the Rayfield, and you should do it if you are following the trend of the heating trade toward oil burning.

For Steam, Vapor, Hot Water, Hot Air

The Rayfield is fully automatic and operates successfully in any good heating plant. It comes in various sizes and has had three years of practical tests in homes, apartments, theatres and factories.

You have been waiting a long time for this scientific oil burner—a burner that you would readily install in your own home after seeing a demonstration.

Send for illustrated circular.

Rayfield Mfg. Co.

21st and Rockwell Sts. CHICAGO

Listed as Standard by the Underwriters' Laboratories

Contractor-Dealers Wanted

The Rayfield franchise will appeal to men who know the heating business. A profitable connection is offered responsible parties who are prepared to demonstrate, sell and install our equipment. Write for territory and further particulars.

Facts that make the Hardinge outstanding

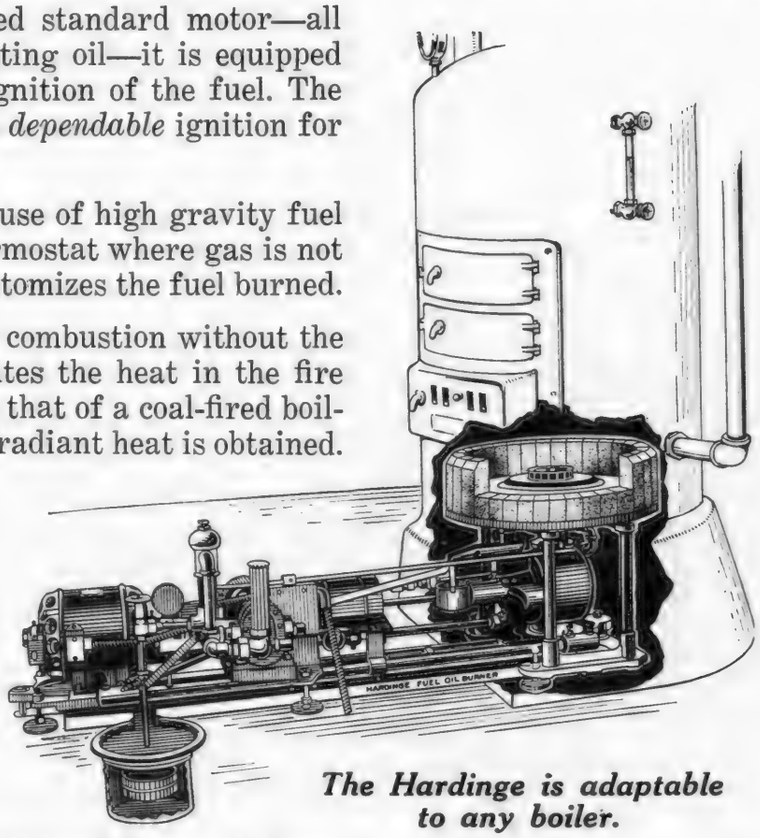
This is a burner that is guaranteed for ten years—that has, by tests, proven more economical—which is quiet in operation—and which is listed as standard by the Underwriters' Laboratories and the Board of Standards and Appeals of New York.

THE Hardinge has a constant speed standard motor—all bearings are submerged in lubricating oil—it is equipped with automatic timing gas valve for ignition of the fuel. The Hardinge has gas ignition, which is the *dependable* ignition for fuel oil.

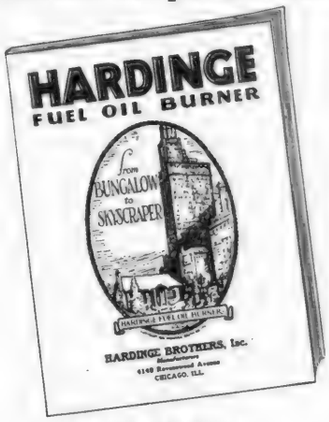
The Hardinge is not confined to the use of high gravity fuel oil. It may be controlled by a room thermostat where gas is not available. The Hardinge mechanically atomizes the fuel burned.

The Hardinge introduces oxygen for combustion without the use of a blower. It uniformly distributes the heat in the fire box of the boiler in a manner similar to that of a coal-fired boiler; therefore a very high percentage of radiant heat is obtained.

The Hardinge has mechanical safety devices embodied in its mechanism. It is protected by numerous patented mechanical features so necessary for the successful operation of a dependable and economical fuel oil burner. All parts are interchangeable.



The Hardinge is adaptable to any boiler.



FREE TO YOU!

This book, telling all about the Hardinge, is yours for the asking. Write for your copy today!

Built to withstand the most thorough investigation—by a company over a third of a century old—and not built to meet a price.

The Hardinge has behind it a company insisting directly or indirectly that prompt service be rendered when necessary—who have sufficient esteem for their product to back every burner manufactured by them with a ten year guarantee.

Important to Dealers

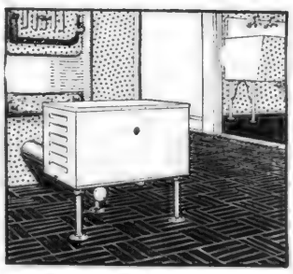
Hardinge dealers are busy the year 'round—our range is from bungalow to skyscraper. Dealers are not required to order any definite number of burners, as the burners will be shipped *only as required*. We invite those who can qualify to join the ever-increasing list of Hardinge dealers. Write for our very liberal dealer proposition today.

HARDINGE BROTHERS, INC., 4149 Ravenswood Ave., Chicago

HARDINGE
FUEL OIL BURNER

NU-WAY *is the Burner with* a Multiple Reputation

The special devices on Nu-way are made by world famous firms—such as Stromberg, Webster Electric, and Emerson Electric, Honeywell, and American Blower. These names are selling helps for Nu-way dealers. They back up our claims for sure automatic control, for long life, for reliable service.

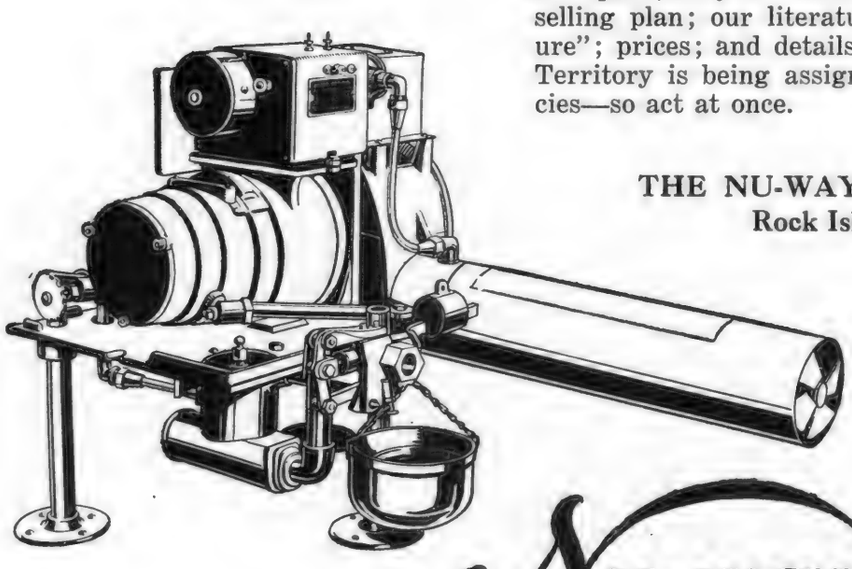


Few Service Calls

Nu-way, because of its simplicity and reliability, requires few service calls. That means bigger final profits. And the range of Nu-way sizes is greater than that of any burner of its type increasing greatly the sales possibilities. Burns from 28 gravity fuel oil to 48 gravity distillate. Easily installed—no part of burner inside the fire box. Dependable, timed ignition. Special protective devices.

Write for Plan

A request, on your own letterhead, will bring you our selling plan; our literature "Home Heating a Pleasure"; prices; and details of our ideal financing plan. Territory is being assigned rapidly to reliable agencies—so act at once.



THE NU-WAY CORPORATION
Rock Island, Illinois

Nu-way

An AUTOMATIC OIL BURNER

Listed as Standard by Underwriters' Laboratories.

OIL HEAT WITHOUT NOISE
—a real selling argument for the May

This letter from a Quiet May dealer offers convincing proof of the satisfaction that results from handling the May. We are constantly receiving letters like it.

W. E. CARLE, President — Phones: Boulevard 201 - 4481 — I. G. BOEHLING, Treasurer

CARLE-BOEHLING COMPANY
INCORPORATED
Plumbing and Heating

REPAIR WORK GIVEN PROMPT ATTENTION

1641 West Broad Street
RICHMOND, VA

"MAY" AUTOMATIC OIL BURNERS

June 11, 1926.

May Oil Burner Corp.
Baltimore, Md.

Dear Sir:

Before taking the agency for the "Quiet May" oil burner for this territory we thoroughly tested the burner and looked up the organization which was behind the marketing of the machine. After satisfying ourselves that the burner was all right in principle, and that the firm was not only financially responsible but have an enviable reputation for fair dealing, we agreed to handle the burner.

Since handling the burner we believe it is the equal, if not superior, to any which we have seen. It is certainly as simple in construction, we think, as efficient in operation and is quieter than any similar type of burner we know of. The last feature is especially appealing to prospects who have had any experience with oil burners.

It is a "quality" burner and should appeal to trade where a matter of price is not the main consideration.

While we have had servicing to do, we believe that a good many of the minor troubles with the earlier burners have now been overcome, and we do not think the machine requires any more attention than any similar automatic device.

Yours very truly,

JGB/Mc. THE CARLE BOEHLING CO. INC.,

Write us today for full information concerning this positively quiet oil burner. Let us explain our new dealer-financing plan. It is being enthusiastically received from coast to coast by dealers with years of oil burner experience. Address Dept. 100. May Oil Burner Corporation, Baltimore, Md.

Quiet May

QUIET MAY AUTOMATIC

AUTOMATIC OIL BURNER

District Offices — New York City 331 Madison Ave. — Boston 1020 Commonwealth Ave. — Philadelphia 2401 Chestnut St. — St. Louis 507 Security Bldg. — Seattle Terminal Sales Bldg.

80.7% efficiency!

There are "spendthrift" oil burners just as there are spendthrift people. An oil burner that blows heat up the chimney is in the same class as the reckless youth who squanders his dad's hard-earned dollars. Both should be shunned.

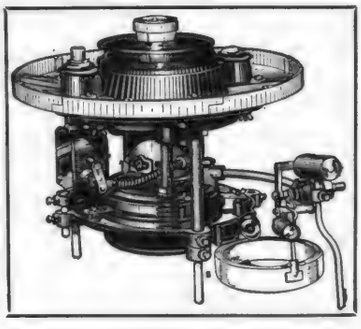
ABC is the Ben Franklin of oil burners. It has no fan or blower to waste heat. That's why it was given the highest heating efficiency rating in the United States Government oil burner test.

Sell the Oil Burner that Squeezes Heat Dollars.

Twelve reasons why an ABC agency makes money

1. **QUIET.** ABC is really quiet. Allowances are not made after installation.
2. **NO CARBON OR SOOT.** Engineers know what an immense advantage this is.
3. **LESS OIL REQUIRED.** Unique means of atomization assures complete combustion. Every particle of oil is burned. The heat rises slowly and is completely absorbed by the boiler.
4. **LONGER BOILER LIFE.** Circular flame, evenly applied all around the boiler, greatly increases its life.
5. **BURNS LOW-PRICED OILS.** ABC burns 28-30 and 32-36 gravity oil.

Passed by New York Board of Standards and Appeals.



6. **ODORLESS.** An ABC heated home is odorless.
7. **NO UNSIGHTLY PARTS OUTSIDE OF BOILER.** This ABC feature has made sales.
8. **SIMPLE.** Only one moving part subject to wear.
9. **NO FAN OR BLOWER.** Heat is not blown up the chimney and wasted. No noisy fan introduces ABC to your guests.
10. **CLEAN.** It's useless to say how clean ABC is. You must see to appreciate.
11. **AUTOMATIC** Heat when you want it—as you want it.
12. **OIL BURNED IN SUSPENSION.**

Approved by Underwriters' Laboratories.

AUTOMATIC BURNER CORPORATION

312 N. May Street, Chicago

ABC OIL BURNER

no noise ~ no carbon

CROSLEY
OIL BURNER

Full automatic control, incorporating features that reduce manufacturing costs, promise low installation expense and minimize service.

Powel Crosley, Jr., as a highly successful radio manufacturer, because of intensive production and merchandising ability, now applies these methods to a unique and remarkably simple oil burner.

(1) Fully automatic with Crosley 110-volt Electric Arc ignition.

(2) Crosley Self-priming centrifugal pump on wall: gravity feed from pump to burner. This pump is original and a feature of the assembly.

(3) Crosley electric double seat solenoid valve controlling oil flow.

(4) Atomization by centrifugal spray and low pressure air. Absolutely non-carbonizing.

(5) Crosley Radio Clarifier built into burner.

(6) Only one model to stock, it having a capacity of ¾ of a gallon to 5 gallons per hour or 250 to 2500 square feet of steam radiation or 3500 feet of hot water radiation.

(7) Burns any oil—not lower than 28° Baume, which will pass the zero cold test and is clean and free from sediment.

(8) Controls are recycling; no unguarded interval.

(9) Ash pit lined with fire brick.

(10) High voltage room thermostat furnished as standard equipment. Low voltage controls interchangeable at additional price. Boiler Control extra.

(11) Motor—1-6 H.P. 3450 RPM Repulsion Induction, brush lifting totally inclosed, air cooled by air for combustion.

(12) Safety Control. Time limit switch shuts down burner after definite interval of attempted ignition. Small quantity of oil (3 pints) is maximum quantity of oil that can be spilled by leaks or breakage of oil line.

(13) Mechanical vibration can not be transmitted to furnace, due to Crosley mounting design.

(14) Motor shafts of burner and pump only moving parts.

(15) All parts compactly and neatly housed in steel stampings of black enamel. Entire burner outside of furnace.

PRICE:

List price is $330 F.O.B. Cincinnati. This includes room thermostat, pump and electric ignition. Installation expense is low—only two factory assembled units and tank to place.

DEALERS:

Crosley acceptance is national. The public will get and believe they will get as great value in his oil burner as they have found in Crosley Radio. Such acceptance makes selling easy. Full details about burner, discounts, sales policy and qualifications necessary to acquire authorized appointment will be sent upon request.

OIL BURNER DIVISION
THE CROSLEY RADIO CORPORATION
CINCINNATI

Powel Crosley, Jr., President

Economical

THE very evident economy resulting from the use of this highly efficient transformer, cannot fail to make its impression upon oil burner manufacturers who are striving for dependability with economy ◦ ◦ ◦ The outstanding characteristic of this ignition unit is the fact that it produces a spark of unusual size and length at normal voltage with an exceptionally low power input ◦ ◦ ◦ This is only one of five outstanding features which the Webster sales department will explain fully upon request.

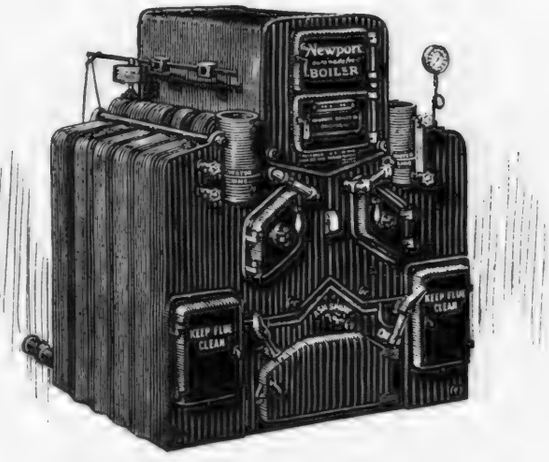
The Webster Ignition Transformer can be furnished with either single or double high tension terminals.

WEBSTER ELECTRIC COMPANY, *Racine, Wisconsin*

"Specialists in Oil Burner Ignition"

Webster W Ignition Transformer

This Company also manufactures the Webster Oil Burner Coil.



Which Cashier Would YOU Patronize?

If you had the choice of selecting a boiler that requires $14 coal or a boiler that requires only $7 coal, which would *you* install in your home? How would *any* home-owner feel about it? Which heating contractor would get their business?

Home-owners have that choice today—old style, surface-feed boilers in which they must use the larger, expensive sizes of anthracite or the NEWPORT which is designed to use (and does use efficiently) the inexpensive grades of anthracite such as No. 1 Buckwheat and Pea coal which sells for about 50% less than the larger sizes.

There is no question that NEWPORT is the outstanding choice of home-owners wherever it is introduced. Not only for the coal-cost saving it makes possible but also for the convenience it provides by delivering uniform heat over long periods without attention. Hundreds of heating contractors are turning to the NEWPORT. The reasons are obvious to any one who knows the facts about this advanced-type boiler. May we send them to you?

NEWPORT

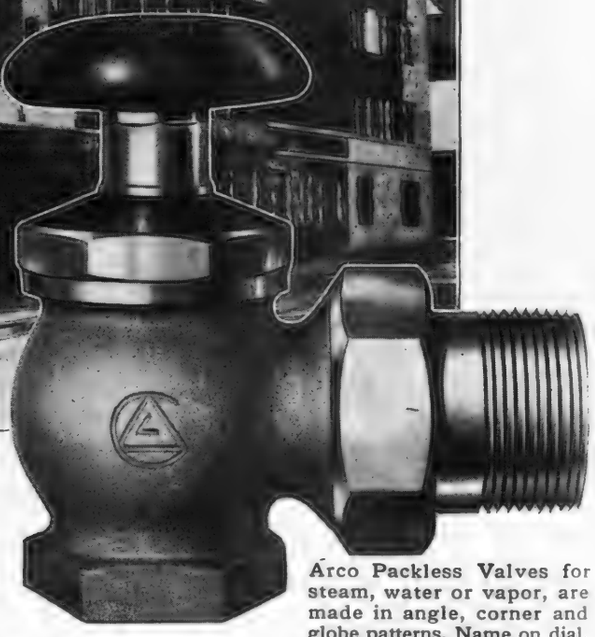
BOILER COMPANY - CHICAGO, ILL.

529 SOUTH FRANKLIN STREET

PRINCIPAL DISTRIBUTING POINTS

New York - Hartford - Boston - Worcester - Albany - Scranton - Lancaster - Philadelphia - Wilmington - Rochester - Buffalo - Cleveland - Minneapolis

Apartment of Trio Development Company, White Plains, New York. William La Qinsk, Architect, New York City. Callahan Engineering Co., Heating Contractor, White Plains, N. Y.



Arco Packless Valves for steam, water or vapor, are made in angle, corner and globe patterns. Name on dial, if desired.

In the finest buildings small or large—

ARCO Packless Valves

No hurried calls for the janitor to stop leaks, no annual repacking of radiator valves is necessary here.

In this fine apartment every one of the 126 radiators is guarded by a valve that is not only handsome, but ends leaks forever.

Arco Packless Valves bring to every building these four advantages:

1 Arco Packless Valves are good looking. They add a finishing touch of smartness to a radiator.

2 They pay for themselves by saving the annual expense of repacking.

3 They prevent leaks—one of which may cost more than all the valves in the building.

4 They add to the comfort of the owner or his tenants. Arco Packless Valves open with one smooth turn.

A heating plant deserves accessories that insure perfect performance. Every radiator deserves an Arco Packless Valve.

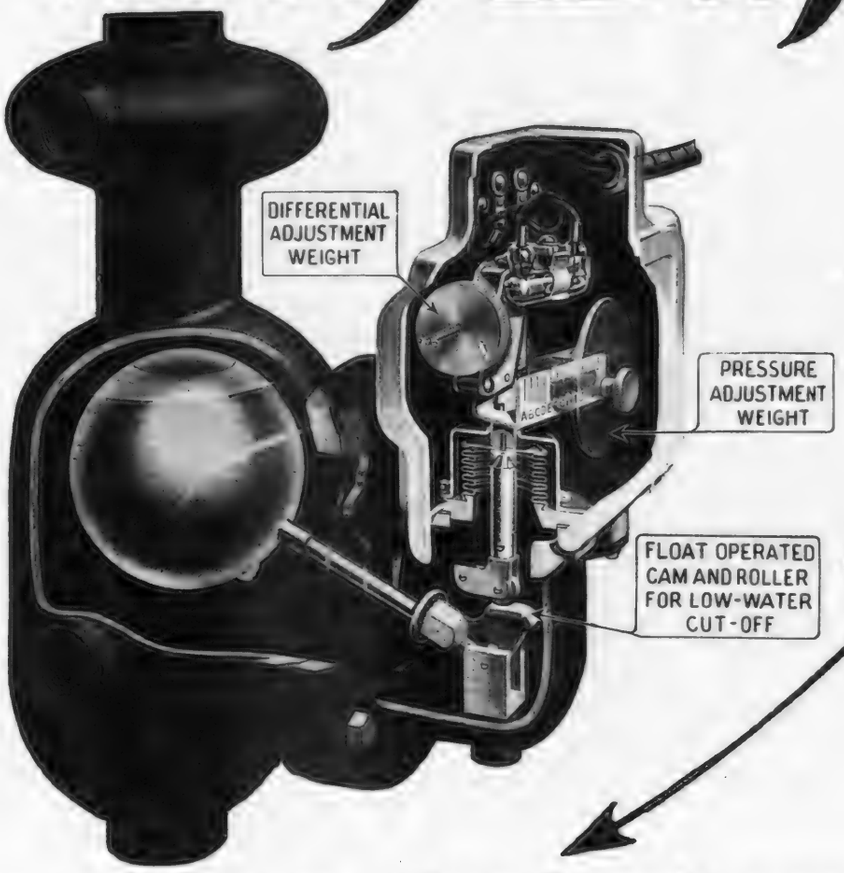
The Arco Packless Valve is one of many heating accessories made and guaranteed by

AMERICAN RADIATOR COMPANY

SPECIALTIES DEPARTMENT

816 So. Michigan Avenue Chicago, Ill.

Why Duplex?



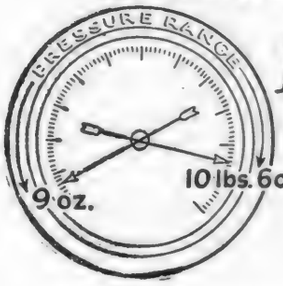
McDonnell & Miller

Duplex Switch
Low Water and Pressure

for oil fired steam boilers

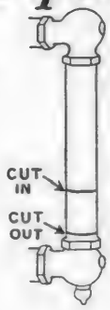
"Sensitive as a fine watch —yet sturdy as the motor which it controls"

Because it has *Two Separate Functions*



Pressurestat

1. *To accurately regulate boiler pressure within any desired limits.* The point of pressure cut-out may be varied over a range of nearly ten pounds — from 9 oz. up. And the difference between cut-out and cut-in pressure may be varied for any requirement from 7 oz. to 5 lbs. 8 oz. It makes no difference what the conditions may be—if your plant is "*low pressure*," the McDonnell & Miller Duplex Switch will furnish both protection and regulation—positively and permanently.



Low Water Cut-off

2. *To protect the boiler against the dangers of low water.* When the boiler water line drops to the bottom of the gauge glass, the Duplex Switch *cuts out* the burner until the water line rises above the danger point, when it cuts the burner *in* again. There can be no burned boilers or cracked sections with the Duplex Switch on the boiler because when the water gets low, the "*springless*" Duplex Switch operates, and cuts off the flame.

Send for our Bulletin V-10—It's yours for the asking.

McDonnell & Miller

BOILER CONTROLS

General Offices • WRIGLEY BUILDING • CHICAGO

Rugged, compact, clean cut in design and construction, the Wayne Oil Burner dominates its field in appearance as well as in performance.

Mechanical Specifications

Type — Atomizing type. Completely automatic.

Motor—Vertical type, slow speed, standard make. From ⅙ H. P. to ¾ H. P.

Ignition—Either gas or electricity is provided at option of buyer.

Fan—Turbine type providing ample volume of air at low pressure, and quietly.

Fan Housing—Heavy casting designed to permit air passage without interference.

Pump—Spiral gear type, carries oil from supply tank to burner unit by suction and delivers it to combustion tube under pressure.

Base—Tripod design. Cast iron, insuring stability and ruggedness. Cork feet.

Combustion Tube—May be placed in firing, clinker or ash pit door of any standard boiler or furnace.

Firing Nozzle — Mounted on swinging breech fitting into combustion tube. Contains atomizing tip and ignition.

Spray Tip—Brass stem with brass or steel head; intake oil passage covered with fine strainer screen.

Thermostat—Plain type. Positive control. Clock type optional at extra cost.

Combustion Control—Prevents operation of motor and flow of oil in case of ignition failure.

Auxiliary Boiler Control—Aquastat for hot water plants; vaporstat for steam and vapor plants and airstat for hot air furnaces; prevents overheating of furnace or boiler.

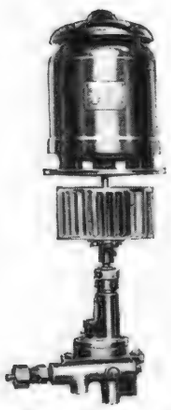
Air Tube—Flexible, seamless metal; permits location of burner at either side or in front of heating plant.

Supply Tank—May be located in basement or may be buried outside.

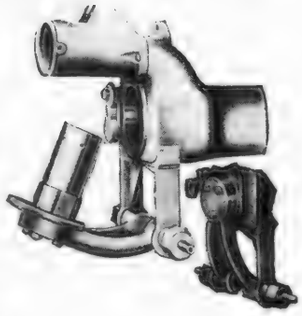
Brick Work (in heating plant) Fire brick combustion chamber built to give utmost heating efficiency.

Capacity—Four sizes. Range from 450 to 10,000 feet of radiation.

Fuel—Listed by Underwriters for 28°-30° Beaume. Also approved by N. Y. Bureau of Standards and Appeals, and by Department of Public Safety of Massachusetts.



Only Three Moving Parts—motor, fan and oil pump. All operate on one shaft.



The Firing Nozzle—on a swinging joint, may be readily removed for inspection. Breech switch shuts off burner when nozzle is out of firing position.

Measurably Better —to Buy and to Sell!

The future of an oil burner dealer is as stable as the burner he sells—and the company that makes that burner.

There is a definite, ever-growing demand for a GOOD oil burner.

There is a definite, ever-growing prejudice against oil burners that are short on the necessary qualities.

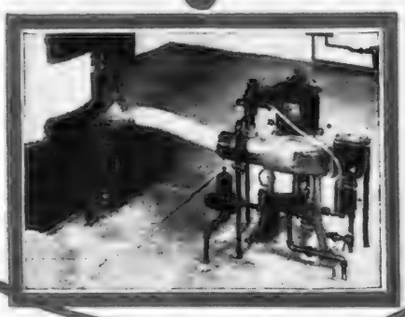
In other words, the oil burner industry has reached the point where only well-built, thoroughly reliable burners can be sold with profit. Buyers today know what to expect of an oil burner—what to demand.

They know that the oil burner that is RIGHT will give them long years of heating service with convenience, cleanliness and economy, and that the burner that is not right will give dissatisfaction from the start.

Alert oil burner dealers see the handwriting on the wall—

"If you would assure a prosperous future, consider well the product you sell — and the company that makes it."

To the Wayne dealer this means success.



A Typical Wayne Installation

Wayne may be installed in any size or type of heating plant. No parts inside or under the heater. No parts subjected to the intense heat within the fire box.

What does it mean to you?

Wayne is fast moving to a position of power and leadership in the industry because Wayne is truly *the better* oil burner — *measurably* better.

Rugged, substantial, dependable, Wayne is built with reverence for details as well as fundamental principles. As rugged as a five ton truck, as finely built as a watch.

The mechanical superiority of Wayne means greater satisfaction, fewer service calls, *greater profit.*

Read the specifications on the opposite page. You will readily see why Wayne is measurably better—to buy and to sell.

Consider the manufacturer, too. The Wayne Company has been building quality products for nearly two generations, with a degree of success that has made the name of Wayne a symbol of quality throughout the world.

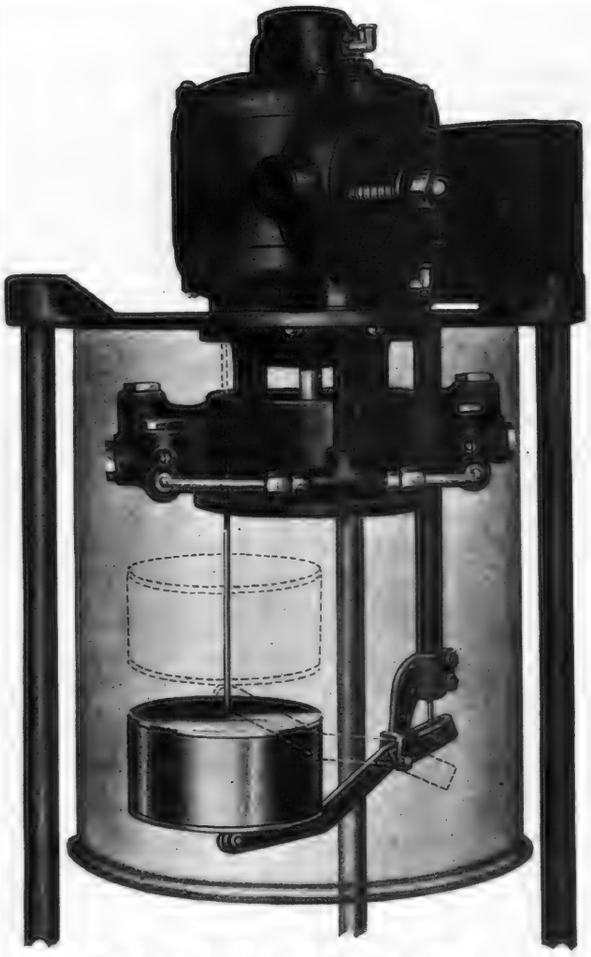
This world-wide reputation of the manufacturer, as well as the merit of the Wayne Burner, goes to assure the success of every Wayne dealer.

Consider well the product you sell—and the company that makes it. Then write for details of the Wayne Franchise. We'll tell you how hundreds of dealers are making money and building a permanent business success with Wayne and how you may do the same.

WAYNE COMPANY - - - FORT WAYNE, IND.

Wayne

THE BETTER OIL BURNER



MONROE Oil Pump

TYPE TJ

This pump is backed by sixteen years of pump manufacturing experience. It can be depended on to operate effectively and silently. It is guaranteed for five years and its performance is such as to relieve the dealer of all pump service troubles and assist the manufacturer of oil burners in the sale of his product because of the better performance of the equipment. Write for folder.

$75 LIST

MONROE OIL STRAINER

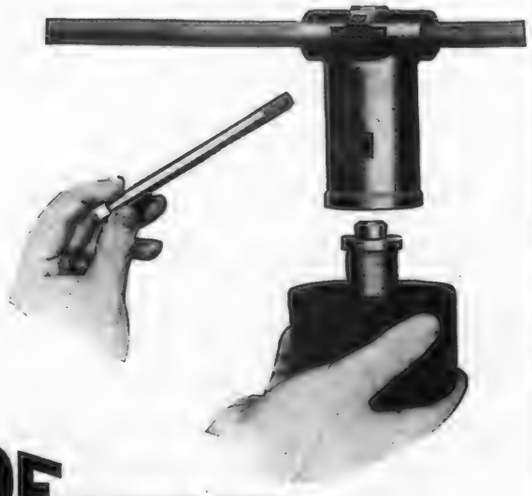
List Price

$5.50

—No leaks
—Easy to clean
—Won't spill oil
—No gaskets
—No drain plugs
—Extra large and strong

Write today for folder

LISTED AS STANDARD BY THE Underwriters Laboratories



Ask for Prices

MONROE MACHINE TOOL COMPANY

NEW YORK SINGER BUILDING 149 BROADWAY

737 W. Jackson Blvd. — CHICAGO

16 YEARS EXPERIENCE MANUFACTURING PUMPS

PHILADELPHIA 437 REAL ESTATE TRUST BUILDING

Note Simple Operation

Oil Heating for Any Building with Aetna TRADE-MARK AUTOMATIC OIL BURNERS

Listed by Underwriters Laboratories, approved by New York Board of Standards and Appeals and all Insurance and Municipal Authorities wherever installed.

Adapted for Steam, Hot Water and particularly for Warm Air Furnaces.

Aetna Dealers Sales with unlimited range of field allowed by nine Aetna sizes, realize real profits.

Nine sizes of burners, consume ½ to 40 gallons per hour and take care of 500 to 20,000 ft. of radiation.

Local distribution since 1916. Now ready for national distribution. Lowest priced high grade burner on the market.

Operates on all grades of fuel oil, 24°-45° A.P.I.

Satisfaction Comfort Safety *are* Guaranteed

The AETNA Automatic Oil Burner is reliable and economical in operation; it is SAFE—safe to sell and safe to use. A master feed-valve *automatically* controls the size of the flame; a thermostat *automatically* regulates heating service; a special oiling system *automatically* lubricates; and the entire Aetna Safety Equipment eliminates possibility of fuel overflow at boiler or from storage tank, as well as safeguards steam pressure or hot-water temperature, to insure positive boiler control and to maintain economic operation at all times.

1916 - 1926

AETNA AUTOMATIC OIL BURNER, INC.

Georgia Ave. Providence, R. I.

The AETNA is built for lifetime service, is mechanically perfect and operates without attention or adjustment.

Write For Dealers' Plan

AETNA AUTOMATIC
OIL BURNER, INC.
Georgia Ave., Providence, R.I.

Gentlemen:

Please send me full particulars regarding the AETNA Dealers' Plan.

Name .....

Street .....

City..... State.....

H & V

Now

Big Saver of Money, Time and Labor

No longer is it necessary to go to the expense and delay of digging a hole 10 ft. deep, or more, in order to bury the oil storage tank below the oil burner. Now oil cannot siphon from the tank in the event of a break in the pipe line to burner even if the tank is buried only a few inches—provided you install

AMERICAN

Anti-Siphon Valve for Oil Burners

This valve permits of direct pipe connection between burner and main storage tank, with the tank at any desired level *above* the burner.

In addition to a substantial saving in installation cost, the American Anti-Siphon valve provides a constant pressure head on the oil pump.

It is tested and listed as standard by Underwriters' Laboratories.

Write for Anti-Siphon Valve Catalog No. 14-1590 or simply *mail the coupon.*

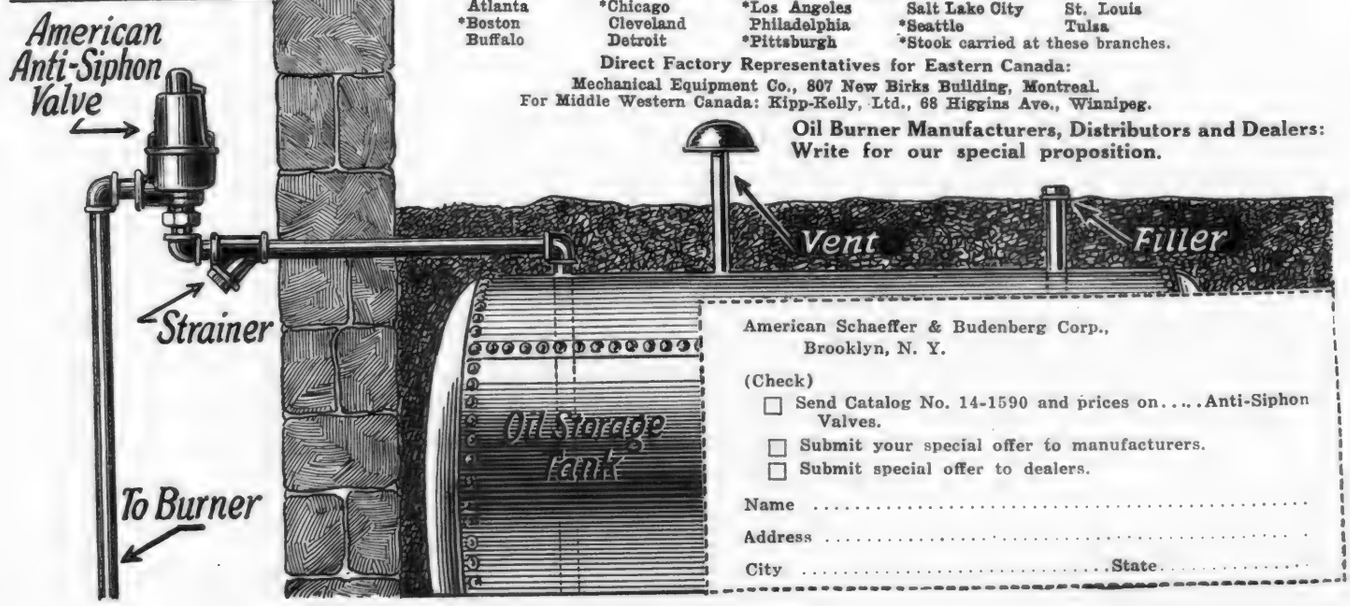
AMERICAN SCHAEFFER & BUDENBERG CORP.

338 Berry St., Brooklyn, N. Y.

Atlanta	*Chicago	*Los Angeles	Salt Lake City	St. Louis
*Boston	Cleveland	Philadelphia	*Seattle	Tulsa
Buffalo	Detroit	*Pittsburgh	*Stock carried at these branches.	

Direct Factory Representatives for Eastern Canada:
Mechanical Equipment Co., 807 New Birks Building, Montreal.
For Middle Western Canada: Kipp-Kelly, Ltd., 68 Higgins Ave., Winnipeg.

Oil Burner Manufacturers, Distributors and Dealers: Write for our special proposition.



American Schaeffer & Budenberg Corp.,
Brooklyn, N. Y.

(Check)

☐ Send Catalog No. 14-1590 and prices on.....Anti-Siphon Valves.

☐ Submit your special offer to manufacturers.

☐ Submit special offer to dealers.

Name .....

Address .....

City .....State.....

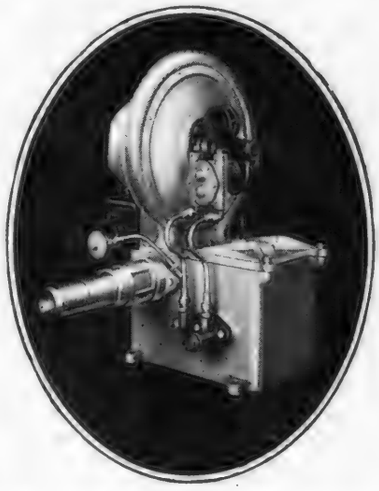
If you are the right man

you can secure an exclusive franchise to sell this remarkable residence burner on a sound, permanently profitable basis

IF you are properly qualified, there is a remarkable opportunity for you right in your city. You can secure an exclusive franchise to sell our remarkable residence oil burner —a burner designed by oil burning engineers who have been in the industry for over a quarter of a century.

The Petro Burner is a perfected, proved machine. It is absolutely free of mechanical and electrical defects. It requires a minimum of servicing expense. Today Petro burners are giving new heating satisfaction to hundreds of home-owners around New York City.

During the past year the Petro has been sold through our offices in New York, Boston, Providence, and Stamford. Now, with greater production, we want dealers in all parts of the country. We want men with intelligence, energy; men who stand well in their community; men with



first-class business reputations—wherever possible, men with previous oil burner experience.

The dealers who are selected have a unique opportunity. They will receive the benefit of our long and successful experience in the business. They will receive every possible assistance, both in engineering service and in selling. They will be assured prompt deliveries. And their selling efforts will be backed by consistent advertising.

Investigate this opportunity immediately. If you feel that you can meet our requirements, clip the coupon, fill it out, send it in today. We will send you an application blank and further information about our proposition.

PETRO

RESIDENCE OIL BURNER

Eleven Reasons why the Petro is a reliable burner and a sound business investment

1. Compact unit—everything mounted on a single base.
2. No parts inside the fire-box of the boiler or furnace subject to the heat of combustion.
3. Vacuum oil pump an integral part of the burner. No overflow line required. This permits tanks to be located above the burner.
4. Air register for admitting proper amount of air to suit size of boiler and draft conditions.
5. Alemite lubrication for the four moving parts, sufficient for a year's operation.
6. Patented anti-siphon valve, preventing any possibility of oil leaks.
7. Patented combustion control, which makes its performance absolutely safe.
8. Specially designed Westinghouse Motor—totally enclosed. No slip rings or brushes. Alemite lubricated.
9. Simplified installation. Pump, controls, all mounted on the burner.
10. Minimum service. Service usually results from mechanical and electrical imperfections. Twenty years' experience has enabled us to free the Petro of all imperfections.
11. Petro Burners are made in various sizes. There is a unit made to fit every residence, and a single Petro Industrial Burner, same in principle as the Residence Burner, which will take care of a 500 h.p. boiler.

A *product of* Petroleum Heat and Power Co., *511 Fifth Avenue, New York*

The Company behind the Petro

The Petro residence oil burner is manufactured by the Petroleum Heat and Power Company. This company has been in the industrial oil burner business for over twenty years. It is a company with ample financial backing. It is directed by able, experienced men—men who know oil burners and the oil burner market.

Thousands of Petroleum Heat and Power Company industrial burners have been installed in schools, hotels, factories, office buildings and public buildings. In 1925 over a hundred million gallons of oil were delivered to customers using Petro industrial equipment. These few installations are typical —Harvard University, the Ritz-Carlton Hotel, the Providence-Biltmore Hotel, the Metropolitan Life Insurance Building, and the Equitable Building.

Petroleum Heat and Power Company
511 Fifth Avenue, New York City

Gentlemen: I am interested in becoming a dealer for the Petro Residence Oil Burner. Please send me an application blank and further information.

Name.....

Street.....

City .....

State.....

BARBER PATENTED

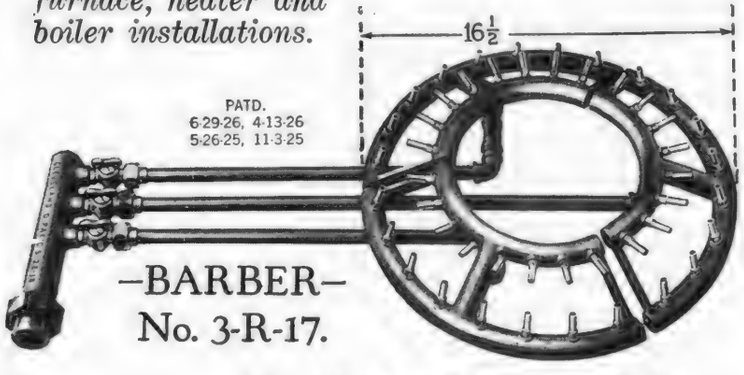
The most modern, scientific and phenomenal advancement in gas burner development—

for

Furnaces, Steam and Hot Water Boilers

Barber Patented Jet Gas Burners are the result of over nine years of careful research. They are the last word in gas burner development and are carefully specified and made by Burner Specialists to suit the exact conditions of the appliance in which they are to be installed. They invariably save their initial cost during the first year of operation, in saving of gas, over older mixer type burners.

Because of their proven economy and efficiency, they are rapidly replacing tens of thousands of older types of burners, as well as being specified and installed in a greater percentage of new furnace, heater and boiler installations.



–BARBER–
No. 3-R-17.

No. 3-R-17 Barber Patented Jet Burner above is shown correctly installed in Round Boiler in the illustration.

Advantages:—

Reduce gas bills 25 to 40%.
Act as their own pilot lights.
Will burn on atmospheric pressure.
Can be quickly installed or removed.
Can be controlled with any good thermostat.
Most economical and efficient on the market.
Develop 1960 degrees Fahr, with 500 B. T. U. gas.
Cannot be affected by corrosion or condensation.
Will not back-fire, or deposit carbon—on any pressure.
Require no adjustment, regardless of pressures or quality of gas.
Produce an orange-green flame with Artificial, Natural or Mixed gases.
Made by the largest exclusive Manufacturers of gas burners in the world.

COMPANY MEMBER OF AMERICAN GAS ASSOCIATION INCORPORATED 1918

The CLEVELAND GAS BURNER & APPLIANCE CO.

Burner Specialists

3702-04 Superior Avenue, Cleveland, Ohio

JET GAS BURNERS

Sensations in Efficiency and Economy

Clean, Even, Economical, Efficient and Convenient Heat

This unprecedented efficiency and economy is the result of even and proper distribution of heat from the lowest practical point in the fire-box, whereby every possible heat-unit is utilized for the proper development of hot water, steam or vapor.

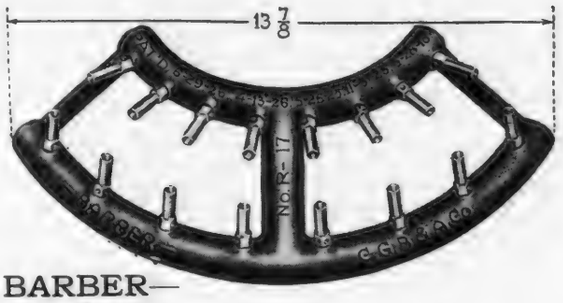
No. R-17 Burner Unit, illustrated, is used to assemble burners requiring more than one unit to provide sufficient heat for Round Hot Water, Steam and Vapor Boilers, as indicated in the table (which does not include all round boilers for which special burners can be supplied).

The assembled burners, illustrated, are for quick installation through clinker door of boiler—or if there is no clinker door, through the ash-pit door.

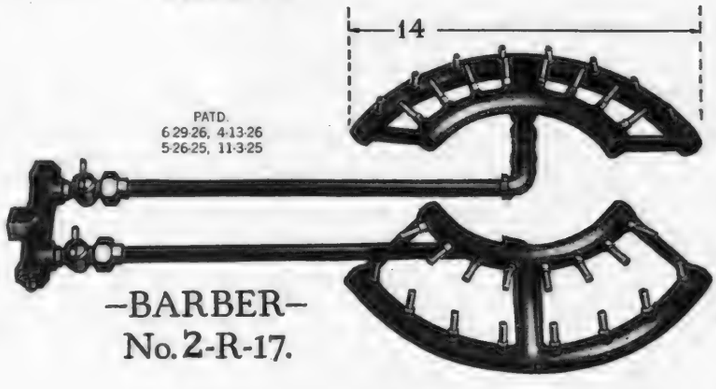
Their unequalled scientific heating principle, backed and guaranteed by the greatest engineering and manufacturing skill, distinguish Barber Burners as the ultimate in gas burner development.

There is a size and type of Barber Burner for every heating appliance. If furnished with trade-name, number, and the name of the manufacturer of any appliance, we will give you complete information and specifications, without obligating you in any way.

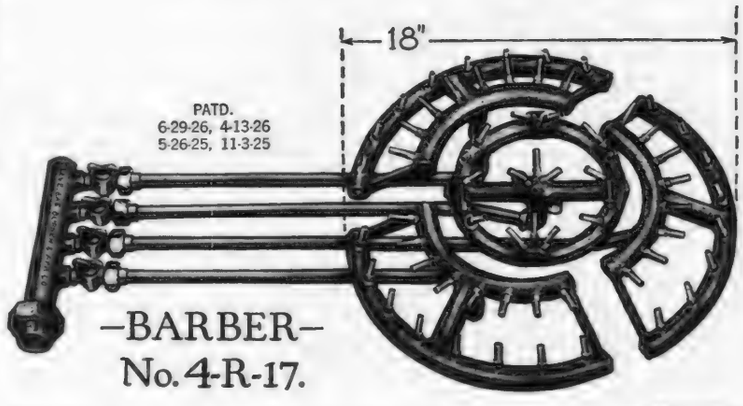
When ordering, state whether for use with Natural, Mixed or Artificial Gas.



—BARBER—
No. R-17



—BARBER—
No. 2-R-17.



—BARBER—
No. 4-R-17.

Detailed installation and operating instructions are sent with all Barber Burners.

SUPPORTING A.G.A. MEMBER

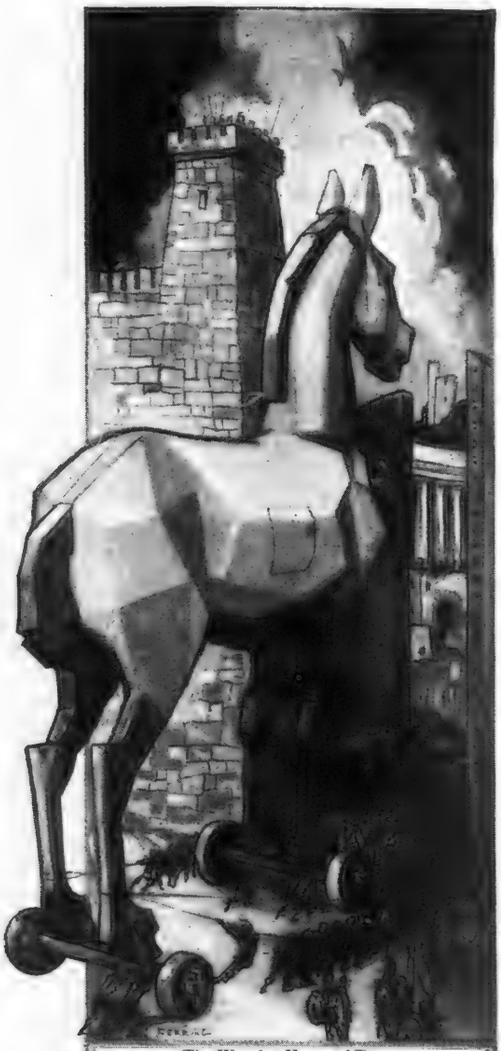
DISTRIBUTORS

Correspondence is invited from business men of established standing who are able to finance their own accounts. With some practical knowledge of the plumbing and heating trade, it is possible to clear big money and establish a permanent business.

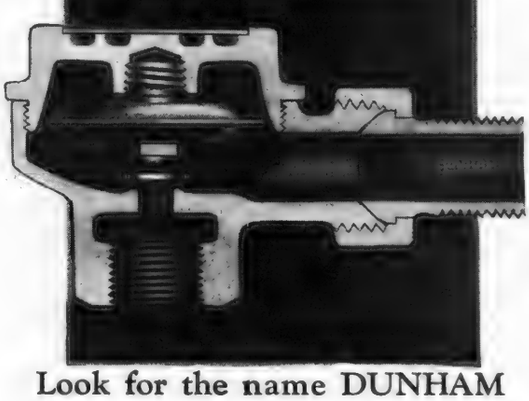
The CLEVELAND GAS BURNER & APPLIANCE CO.

Burner Specialists

3702-04 Superior Avenue, Cleveland, Ohio



The Wooden Horse of Troy
looked all right from the outside, so the Trojans wheeled it into their city. Inwardly the horse was filled with Greek soldiers who in the night opened the city gates to their countrymen.



Look for the name DUNHAM

This nameplate identifies a genuine Dunham Thermostatic Radiator Trap. It is placed on the Dunham Trap for your protection and it is your assurance of the Dependability and Satisfaction which characterize Dunham Heating Service.

All right from the outside

IT IS impossible to judge a radiator trap by externals. The inward design and construction —the operating member in particular—determine how trouble-free a trap may be.

A radiator trap may look all right from the outside, but inwardly, like the famous Trojan horse, it may be filled with trouble.

The sectional illustration at the left shows clearly the *internal advantages* of the Dunham Trap. Note its large valve opening—its floating valve and rounded seat. Observe how these combine to insure tight closing even when scale or other incrustants are present in the heating system. Due to the shape and material of the operating member the seat closes squarely *always.*

Non-corrosive metals are used for all parts in contact with steam, phosphor bronze being the material in the Dunham disc. (The body of the Dunham Trap is distinctive, being made of bronze, the best of all metals for this purpose.) Small wonder the long life of these traps is proverbial in the heating field.

The Dunham Trap was *first* to use the fluid thermostatic principle, and also was first to utilize the floating valve and other features here described. *In quality of materials, in workmanship, and in service performed, the Dunham Trap has always led all its imitators.*

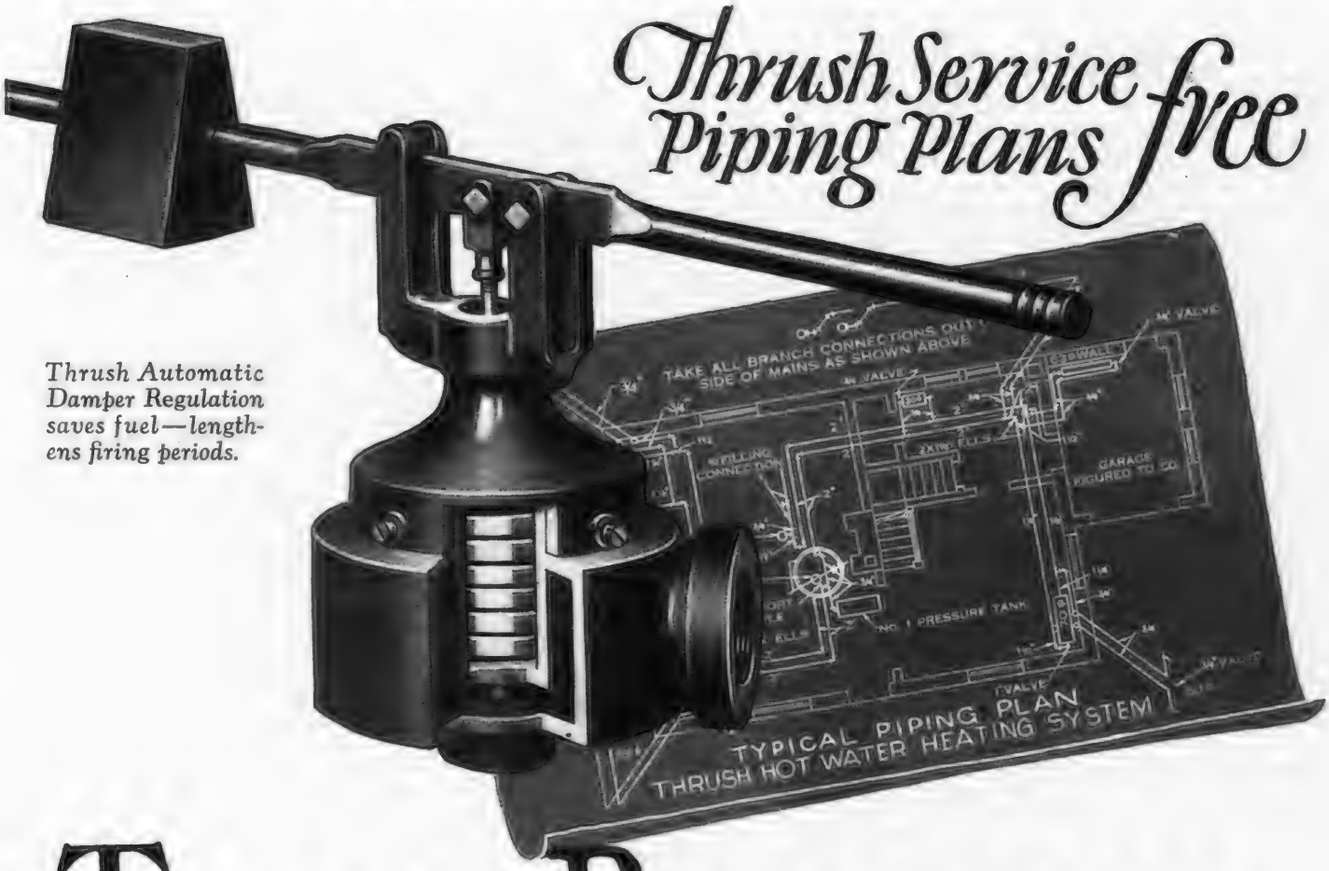
Over sixty branch and local sales offices in the United States and Canada bring Dunham Heating Service as close to you as your telephone. Consult your telephone directory for the address of our office in your city.

C. A. DUNHAM CO.

DUNHAM BUILDING

450 East Ohio Street ~ ~ ~ Chicago

Thrush Service Piping Plans free



Thrush Automatic Damper Regulation saves fuel—lengthens firing periods.

Thrush Regulation *for Hot Water Heating!*

MORE satisfaction to your customers and to you, more profit, more sales—if you push Thrush System of Hot Water Heating. Tank-in-basement where it can't freeze. Thrush method traps air from system into tank so it won't waterlog. Closed system under pressure, increased heat transmission, greater fuel efficiency. Easy to install—not expensive either.

H. A. THRUSH & CO., *Peru, Indiana*

THRUSH SYSTEM
OF HOT WATER HEATING

Send for illustrated catalog. It's filled with useful data and tables for heating contractors. Sent gladly, without obligation. Use this coupon now!

H. A. THRUSH & CO.,
Peru, Indiana. _____ 19____
Please send catalog to
Name_____
Firm_____
State_____ City_____

The ADSCO Packless Graduated Radiator Valve controls the steam entering the radiator. No more steam is used than necessary to maintain the desired temperature.

The ADSCO Damper Regulator keeps an even pressure as low as 2 oz. on the boiler. It never lets the boiler generate more steam than is called for. An automatic and positive check and damper control.

The ADSCO Return Fitting used on small installations allows free discharge of air and condensate from radiator.

ADSCO Thermostatic (14 corrugation 1¾" diam. bellows) Radiator Trap used on larger installations is guaranteed 5 years.

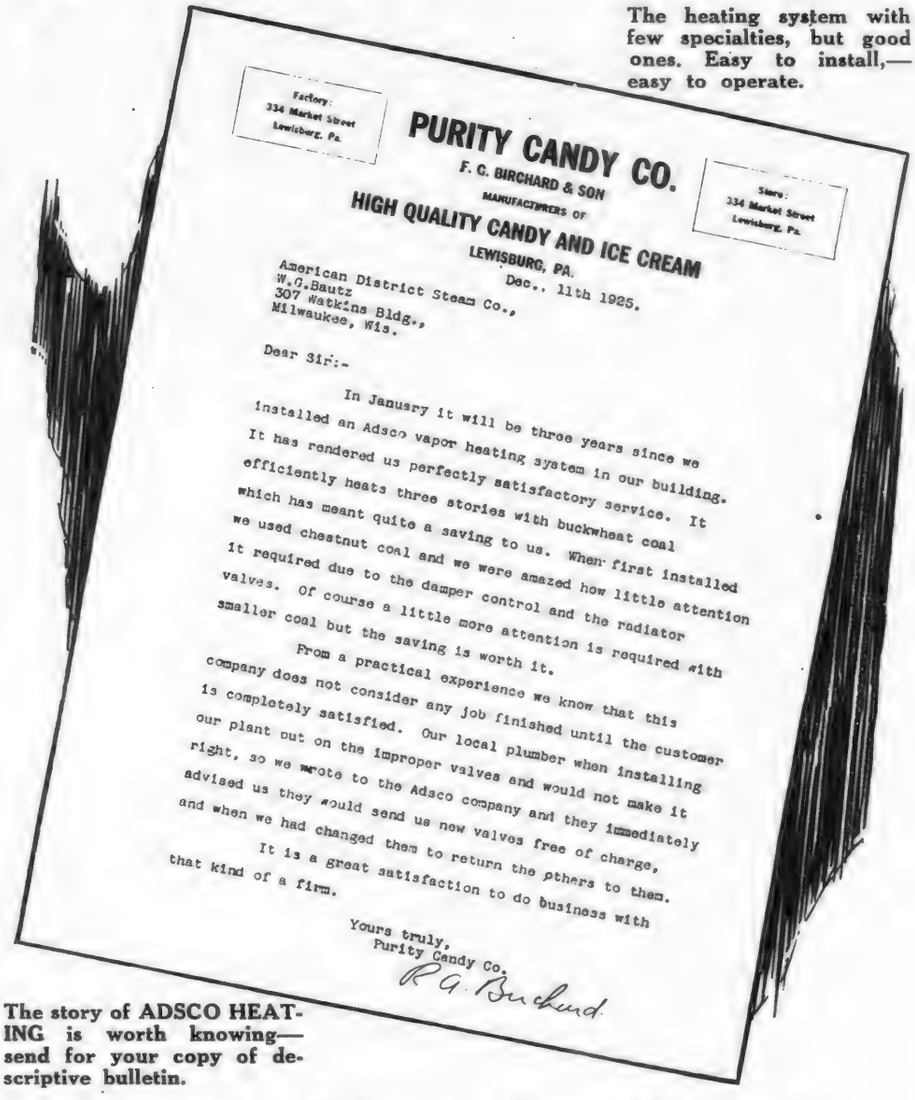
The ADSCO Air Eliminator discharges the air from the entire heating system. It prevents steam or water from leaving the plant.

Give Your Customers the advantage of comfortable heat

with the

ADSCO VAPOR SYSTEM

The heating system with few specialties, but good ones. Easy to install,—easy to operate.



Factory:
334 Market Street
Lewisburg, Pa.

PURITY CANDY CO.
F. C. BIRCHARD & SON
MANUFACTURERS OF
HIGH QUALITY CANDY AND ICE CREAM
LEWISBURG, PA.

Store:
334 Market Street
Lewisburg, Pa.

Dec., 11th 1925.

American District Steam Co.,
W.G.Bautz
307 Watkins Bldg.,
Milwaukee, Wis.

Dear Sir:-

In January it will be three years since we installed an Adsco vapor heating system in our building. It has rendered us perfectly satisfactory service. It efficiently heats three stories with buckwheat coal which has meant quite a saving to us. When first installed we used chestnut coal and we were amazed how little attention it required due to the damper control and the radiator valves. Of course a little more attention is required with smaller coal but the saving is worth it.

From a practical experience we know that this company does not consider any job finished until the customer is completely satisfied. Our local plumber when installing our plant put on the improper valves and would not make it right, so we wrote to the Adsco company and they immediately advised us they would send us new valves free of charge, and when we had changed them to return the pthers to them.

It is a great satisfaction to do business with that kind of a firm.

Yours truly,
Purity Candy Co.
R G. Birchard

The story of ADSCO HEATING is worth knowing—send for your copy of descriptive bulletin.

AMERICAN DISTRICT STEAM COMPANY

GENERAL OFFICES AND WORKS
NORTH TONAWANDA, N.Y.

New York	Chicago	Seattle
1440 Broadway	712 First Nat'l Bank Bldg.	Alaskan Bldg.

AMERICAN DISTRICT STEAM COMPANY North Tonawanda, N. Y. H

Please send Book on ADSCO HEATING and full information about Valve, Regulator, Traps, and other specialties that make this vapor system the most economical.

Name .....

Address .....

Heating School Buildings

Note the names—you know the enviable reputations—of the architects, engineer and heating contractor on this installation, the West Orange High School, West Orange, New Jersey. Architects, Guilbert & Betelle, Newark; Engineer, Werner Nygren, New York City; Heating Contractor, John F. Craig, Inc., Jersey City.

Why

Leading Architects, Engineers, Heating Contractors agree on BARNES & JONES SYSTEM for Heating School Buildings.

Because They Know

That Uniformity of Temperature and Reliability are prime essentials in heating school buildings from the standpoint of pupils and teachers, while fuel economy is an added requirement upon which municipal authorities must keep a watchful eye.

That the BARNES & JONES System of Heating has met these and all other demands—in scores of the most up-to-date school buildings—being readily adaptable to either direct or indirect radiation and satisfying even the most rigid demands of schoolroom and auditorium heating.

That our more than twenty-five years practical experience designing, manufacturing and observing the installation of apparatus of this type has enabled us to perfect our heating appliances to meet the many requirements peculiar to schoolhouse heating.

Vapor and Vacuum Heating Systems of Proven Quality

Barnes & Jones

Representatives in Principal Cities

5 Melrose Street, Boston — *300 Madison Ave., New York*

9 reasons why you should sell the Efficient Heating Boiler—

WATER TUBES made of seamless steel tubing. The metal is only 1/8 inch thick. The most rapid transfer of heat from the hot gases around the tubes to the water within the tubes is thus accomplished. A striking contrast to the thick cast iron sections found in most boilers.

THE TUBES ARE NUMEROUS as well as small which brings a large heating surface in contrast with a small volume of water. Quick steaming — less time and the result is less fuel used.

THE TUBES ARE SLOPED at an angle of 10 degrees, giving positive and rapid circulation of the water from the back to the front of the boiler and preventing the tubes from becoming steam bound.

TWO BAFFLES causing the hot gases to pass three times over the tubes, instead of only once. This removes the largest amount of heat from the gases before entering the chimney. The temperature of the gases entering the chimney is seldom more than 235°, which is only about 20° above the temperature of the steam in the boiler.

STEEL HEADERS, into which the tubes are expanded by rolling out their ends, have removable cover plates which makes cleaning of the inside of the tubes easy and positive.

STEAM DRUM, made of steel boiler plate with welded joints, gives ample storage space for steam and water.

BRICK SETTING, or specially designed sheet iron setting which minimizes the loss of heat thru its walls. The sheet iron setting is built in sections that are easily bolted together, can be set up in a very short time. Each section is made up of layers of sheet iron with a half inch space between them. This space is filled with a half inch layer of asbestos to prevent heat from escaping.

THREE CLEANING DOORS in the side of the setting. The outside of the tubes can be reached thru these doors. Any soot that may collect on the tubes can be removed with a long handled wire brush.

THE BOILER IS SMALL and light in weight in spite of its large heating capacity. Any "Efficient Heating Boiler" can be carried thru the ordinary two-foot-six doorway.

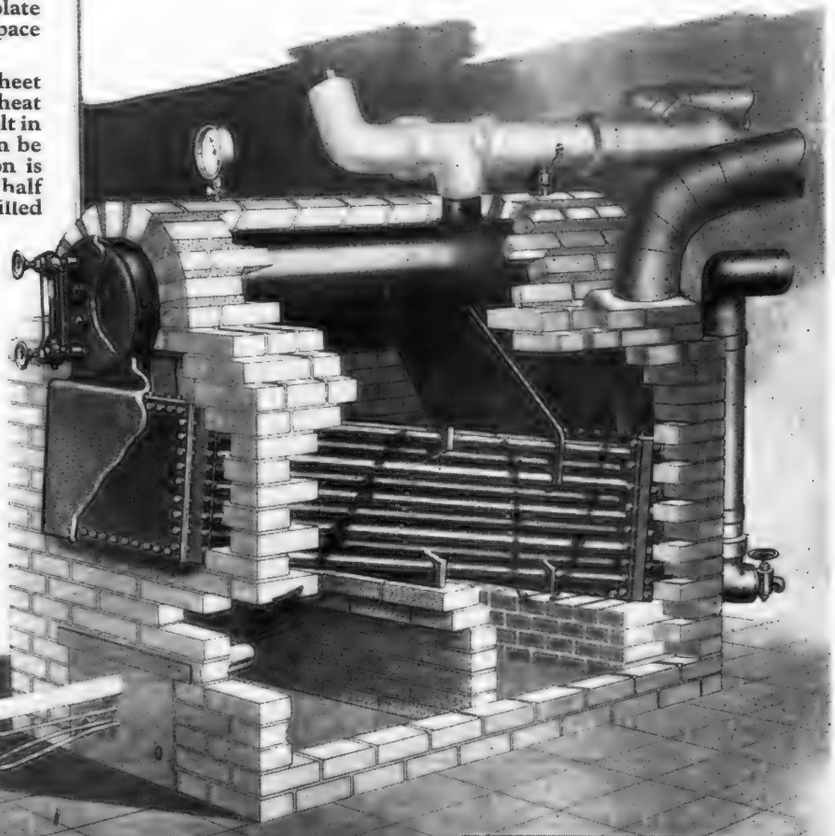
Efficient Heating Boiler Company
4116 So. Halsted St., Chicago, U.S.A.

NOW

EFFICIENT HEATING BOILER

—a water tube boiler——

for oil heating in homes, small apartments, hospitals, clubs, hotels, factories, etc. — —



This cut-away view shows how the hot gases are directed by the baffle plates to completely surround and heat the water tubes.

Dealers—
Distributors—
Heating Contractors—

write for special sales information, prices and literature.

Schools!

In almost 6,000 schools and colleges, Webster Systems of Steam Heating play a vital part in insuring the health and comfort of the youth of America.

Whether the project is a splendid new addition to one of America's great universities, or the humble schoolhouse planned by a small township for the children in primary grades . . . Webster Systems of Steam Heating meet the requirements for efficient and economical heating service.

School executives, architects, engineers and heating contractors should consider the four heating success factors in each Webster System of Steam Heating—Service . . . Experience . . . Webster System Equipment . . . Webster Engineering Methods.

Write us today for details.

Warren Webster & Company

Pioneers of the Vacuum System of Steam Heating

Camden, N. J. 50 Branch Offices

In Canada, Darling Bros., Ltd., Montreal

- since 1888

Webster Systems of Steam Heating

ALABAMA

East Thomas Scho
Minor School, Birr
Citronelle School,
Barton Academy,
Old Shell Road Sc
E. I. Russell Schoo
Raphael Semmes S

ARKANSAS

Eldorado Arkansas
Ft. Smith Arkansa

CALIFORNIA

Alameda High Sch
Lincoln School, A
Fremont Elementar
Los Angeles
Albion School
East First Stree
Fifty-Second Str
Franklin School
Freemont Schoo
Gardner Street
Hammel Street
Herman Avenue
Humphrey Aven
Laguno School
Lincoln School
Malabo School
Ninety-fifth Stre
Raymond Avenue
Second Street S
Thirtieth Street
Twentieth Street
Virgil School A
Wadsworth Scho
West Athens Sc
Cole School, Oakla
Hawthorne School,
Maxwell Park Sch
Prescott School, (
Abraham Lincoln
Cleveland School,
Portorville School,
Franklin School, R
Kingsbury School,
Barton Hill Schoo

COLORADO

Ivywild School. Co
Denver
Adams Street Sc
Alcott School
Ashland School
Berkeley School
Boulevard Schoo
Bromwell School
Bryant School
Cheltenham Schc
Colfax School
Columbine Schoo
Corona School
Ebert School
Edison School
Elmwood School
Fairview School
Franklin School
Garden Place
Garfield School
Globeville Schoo
Lincoln School
McKinley Schoo
Myrtle Hill Sch
Park Hill Schoo
Perry School
Smedley School
Steele School
Teller
University Park
Valverde School
Villa Park
Manzanola School
Pueblo
Bessemer School
Carlile School
Central Grade S
Columbia Schoo
Corona School
Edison School
Fountain School
Lakeview Schoo
Lincoln School
Minnequa Schoc
Parkview Schoo
Somerlid School

CONNECTICUT

Cos Cob School,
Byram School, Gr
North Mianus Sch
Huntington Grade
Lincoln High Sch
Trumbul Grade Sc
Ezekiel Cheever S
Maple Street Schc
Southington Grad
Stevens School, S
Russell School, W
Bedford Jr. High
Winsted East Sch

DELAWARE

Claymont Public S
Elizabeth W. Murp

DISTRICT OF COL

John Ross School,

FLORIDA

Magnolia Grammar
Palatka School, Pal
Grade School, Talla
Palma Ceia Park C
Zephyrhill School, Z

GEORGIA

Atlanta
East Atlanta Eler
English Avenue
Faith Street Schc
Frazier Street Sc
Lucile Avenue Sc
Peeples Street Sc.
Tenth Street Sch
Houghton Grammar
Buford School Buil
Dublin Grammar Sc
Virgil Powers Schoc
Newnan Cotton Mil
Bibb Mfg. Co. Gra
Berry School, Rome

IDAHO

Independent School
St. Maries Grade S

ILLINOIS

School Building, Ac
Lovejoy School, Att
Horatio G. Bent Sc
Grade School, Buck
School, Buffalo
Cairo School No. 1,
Cairo School No. 2
Carbondale School,
Columbia School, C
Grade School, Char
Chester High Schoc
Community Hill Sc
Washington School,
Joseph G. Cannon
Mary M. Gallagher
Tilton School, Dan
Durfee School, Dec
Elementary School,
Grade School, Deca
Grade School, Elkh
Farmersville School,
Central School, Gal
Cooke School, Gales
Douglas School, Ga
First Ward Grade
Grade School, Geor
Central Grade Schc
Webster School, Gr
Greenfield School,
Harrisburg School,
The Lowell School,
Central School, Jol
Central School—Gy
Jefferson School, L
Lincoln School, Ma
Logan School, Mat
Blackstone School,
East Side Grade S
Mt. Vernon School,
Emerson School A
William H. Hatch
James Russell Low
Payna School, Payn
Douglas School, Pe
Glen Oak School,
Peoria Public Scho
School, Peoria Heig
Madison School, Q
Rockford
Blake School
Colonel Ellis Sch
Garrison School
J. Herman Halls
Kent School
Turner School
Butler School, Spri
Feitchans School, S
Grade School, Sulli
Junior High and G
Ward School, Urba
Glen Flora Grade
Jackson School, W
Northwest Grade S
Central Avenue Sc
Logan School, Wil
District No. 125 Sc
Winnetka School, S

INDIANA

School, Charlottesvi
Grade School, Colu
Henry Reis School,
Douglas School, Ha
Huntingburg Schoo.
Public School, Jasp

McKinley School,
Liberty Township
Muessel School, So
St. Stevens School
Polk Township Sch
Waterloo S

IOWA

Consolidate
Buchanan
Clarinda S
Hawthorne
Bloomer S
Fulton Sch
Wells-Carr
Consolidate
Harding S
School Bu
Consolidate
Grant Sch
Longfellow
Riverview

KANSAS

Lincoln S
Roosevelt
Bubler Sc
Lincoln Sc
Deerfield S
Frankfort
Kansas City
Louisa
Chelsea
Columbia
Dunbar
Five Ki
Guinda
Major
McKinle
Roosevel
Mark T
Snow S
Whitmor
Whittier
Maple Hi
Marysville
Lincoln Sc
Wichita
Horace
Martinso
Riverside
Waco Sc
Woodlan

KENTUCKY

Elkton Sch
Consolidate

LOUISIANA

Negro Sch
Convention
Dufrocq Sc
Nicholson
Longville
Convent of
Sulphur La
Ville Platte

MAINE

Thirteenth
North Sche
North Sche
Lincoln Sch

MASSACHU

Elementary
Ashland St
Runkle Sch
Beaver Cou
President A
Academy S
Saxonville Schoo
Ipswich School, Ip
Batcheller School, I
Euclid Avenue Schc
Tracy School, Lyn
Grade School, Marl
Tucker School, Mil
Summer Street Sch
North Woburn Sch
Newell Street Schoc
Somerset Grade Sc
South Attleboro Sc
Chestnut Street Sc
Lincoln School, Spr
Rushville Grade Sc
Seymour Street Sch
Greenwood Gramma
Lyman School for
Davis School, West
Williams College D
Lincoln School, Wi
Ledge Street Schoo
Pine Hill Road Sch
Rice Square School,

MICHIGAN

Allegan School, All
Jones School, Ann
Sixth Ward School,
Wilson School
Kalamazoo
Fractional School
Frank Street Schc
Hillcrest School
Lake Street Schoo
North Westnedge
Northwest Street
Portage Street Sc
Vine Street Schoo
West Main Street
Westnedge School
Lansing
Allen Street Schc
Danville School
East Park School
Everett School
Holmes Street Sc
Miller Road Schc
Walnut Street Sc
Lapeer School, Lap
Ludington School,
Mason School, Mas
Milford School, Mil
Montrose School, M
Mt. Morris School,
Bunker Street Schoc
Fairview School, M

Geo. W. Balch Sch
Barstow School
Burroughs School
Carstens School

A. M. Hunter Schc
Perry School, Perry
Glenwood Elementa
Webster School, Po

School Building,
Holmesville Schoo
School Building, I

NEW HAMPSHIR

Washington Schoo
Askew School, Ka
Hamilton School,
Karnes School, Ka
Washington School
John Burroughs S
Intermediate Schoc
Principia, School,
Warsaw, Missouri
Wellston, Missouri

NEBRASKA

School Building,
Allen School, Alle
Grade School, Alli
School Building,
Barneston School,
School Building, I
Bayard Grade Sch
Belvidere School,
Belgrade School,
Rose Hill School,
Grade School, Cen
Grade School, Cha
School Building, C
Eagle School, Eag
School, Franklin
Grant School, Gra

Park School
Prescott School
Randolph Schoo
Whittier School
Willard School
Macey School, Ma
Consolidated Schoc
School Building,
Odell School, Ode
Omaha
Clifton Hill Sch
Druid Hill Schc
Franklin School
Lathrop School
Minne Lusa Sch
Pacific School
Park School
Sheridan School
South Franklin
Yates School
School Building, F
New School, Plain
School Building, S
Third Ward Schoo
Valentine School,
Waverly School, V
Consolidated Schoc
School House, We
Three Grade Schoc

Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Public School,
Delmar School,
Hooper School,
Fayetteville School
Oak Street School,
Union Free School
West Hill School,
Durans Eastman S
Irondequoit School,
School, No. 1, Iro

Listed on this page are only a portion of the 6,000 and more Webster-heated schools located thruout the United States.

Announcing the new and "Warco" Automatic

TRADE MARK REGISTERED

"WARCO" No. 1
⅛" Side Outlet Air Valve—for Radiators.

"WARCO" No. 2 Vacuum
⅛" Side Outlet Vacuum Air Valve—for Radiators.

Seven "Warco" Valves that fill every air valve need.

At prices lower than other high grade air valves.

With improvements possessed by no other valves on the market—guaranteed for 5 years.

To be sold exclusively through the wholesaler and manufacturer of plumbing and heating supplies.

To be advertised widely to the Heating and Plumbing Trade.

"WARCO" No. 3
¼" Bottom Outlet Air Valve—for Mains, Coils and Risers.

"WARCO" No. 3 Vacuum
¼" Bottom Outlet Vacuum Air Valve — for Mains, Coils and Risers.

Valve illustrations approximately ½ actual size

standardized line of

Air & Vacuum Valves

W. A. RUSSELL & COMPANY, always a leader in the development of fuel-saving valves for steam radiators, now offers the heating industry a new and improved line, with qualities never before attained in air and vacuum valves.

To this line is given the name "WARCO" —already well known to the Heating and Plumbing Trade.

The new "WARCO" line is shown on these pages. It consists of seven perfected Air and Vacuum Valves—and on these seven valves the manufacturing and sales efforts of W. A. Russell & Co. will henceforth be concentrated.

W. A. Russell has been making air valves for 36 years. His was the first volatile liquid air valve placed on the market. His inventive genius is the basis of all successful air valves in use today.

In concentrating on these seven "WARCO" Valves, this company is now putting out a line which experience has shown will fill *every air and vacuum valve need.*

Ask your wholesaler to show you the "Warco" line or write us for circulars and complete information.

W. A. RUSSELL & CO.

Grand Central Terminal Bldg.

NEW YORK CITY

Chicago Boston Pittsburgh Los Angeles

Established 1890

"WARCO" No. 4

¾" Bottom Outlet *Quick Vent* Air Valve—for Mains and HV Stacks.

Note: Will not close against water.

"WARCO" No. 5

⅜" Bottom Outlet Quick Vent Air Valve — for Mains, and HV Stacks.

Note: Contains Float—will close against water.

"WARCO" No. 6 Vacuum

⅜" Bottom Outlet Quick Vent Vacuum Air Valve —for Mains, and HV Stacks.

Note: Contains Float—will close against water.

Backed by 25 years of Manufacturing Experience

MILVACO

THERMOSTATIC TRAP

Conceived, designed and built to a purpose — the elimination of trap troubles — the ***Milvaco Thermostatic Trap*** embodies in its detail of construction, principal of operation, and accomplishment of purpose, a standard synonymous to the Milwaukee Valve Company.

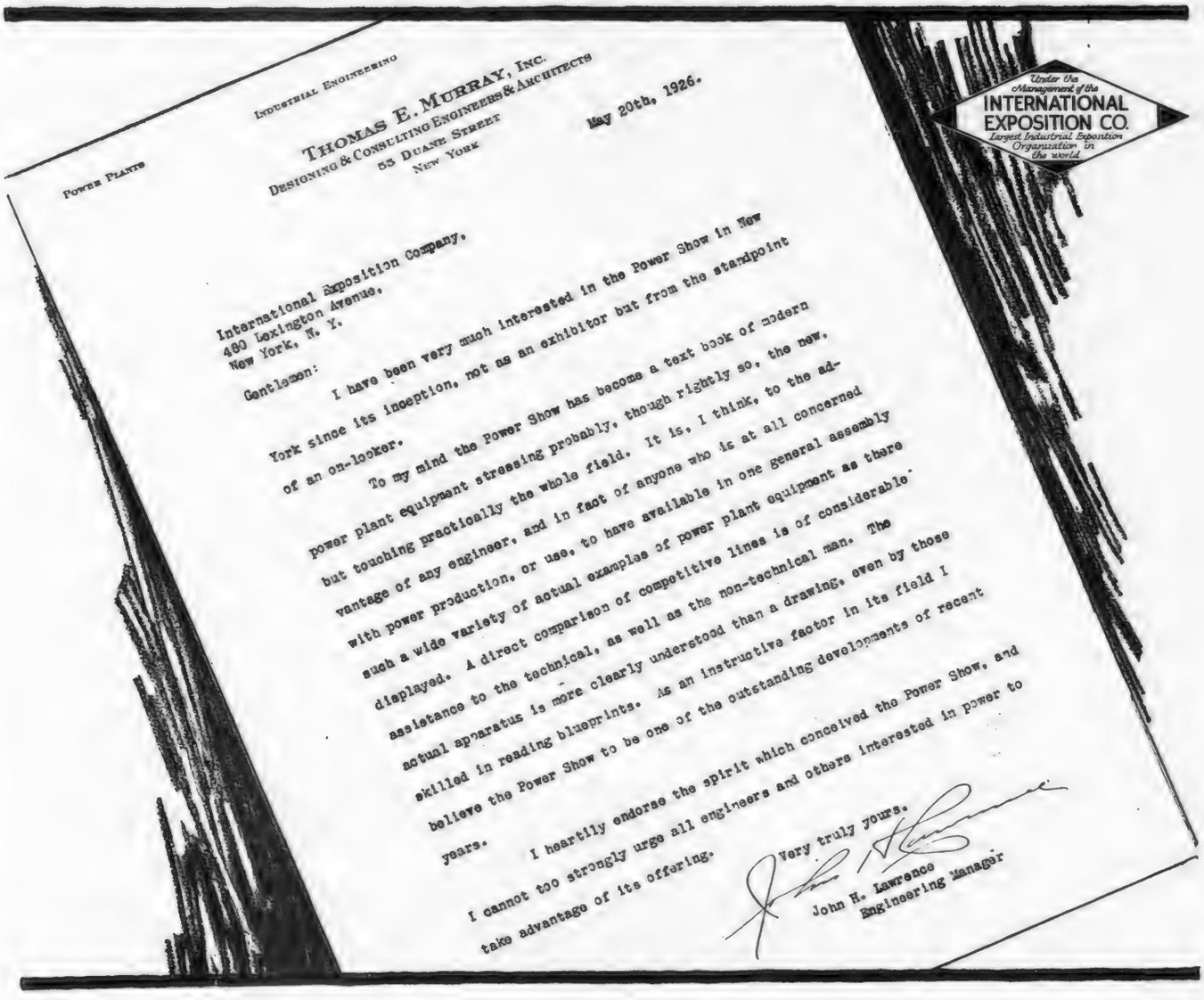
Backed by twenty-five years of manufacturing experience —A message with a meaning to the discriminating buyer.

Bulletin No. 23 descriptive in detail of the Milvaco Thermostatic Trap will gladly be mailed you upon request.

MILWAUKEE VALVE CO.

MILWAUKEE, WISCONSIN, U. S. A.

"Engineers" includes Heating and Ventilating Engineers Now read:—



INDUSTRIAL ENGINEERING

POWER PLANTS

THOMAS E. MURRAY, INC.
DESIGNING & CONSULTING ENGINEERS & ARCHITECTS
55 DUANE STREET
NEW YORK

May 20th, 1926.

International Exposition Company,
480 Lexington Avenue,
New York, N. Y.

Gentlemen:

I have been very much interested in the Power Show in New York since its inception, not as an exhibitor but from the standpoint of an on-looker.

To my mind the Power Show has become a text book of modern power plant equipment stressing probably, though rightly so, the new, but touching practically the whole field. It is, I think, to the advantage of any engineer, and in fact of anyone who is at all concerned with power production, or use, to have available in one general assembly such a wide variety of actual examples of power plant equipment as there displayed. A direct comparison of competitive lines is of considerable assistance to the technical, as well as the non-technical man. The actual apparatus is more clearly understood than a drawing, even by those skilled in reading blueprints. As an instructive factor in its field I believe the Power Show to be one of the outstanding developments of recent years.

I heartily endorse the spirit which conceived the Power Show, and I cannot too strongly urge all engineers and others interested in power to take advantage of its offering.

Very truly yours,
John H. Lawrence
Engineering Manager

Under the Management of the INTERNATIONAL EXPOSITION CO. Largest Industrial Exposition Organization in the world

Nearly four hundred engineers and architects under the direction of Mr. Lawrence include a large department specializing in the solution of heating and ventilating problems. This phase of engineering was necessarily in Mr. Lawrence's mind when he dictated the letter shown above. His letter is typical of many. It is worth reading and heeding.

Plan definitely now to visit the

FIFTH NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING

Grand Central Palace, New York, December 6 to 11, 1926

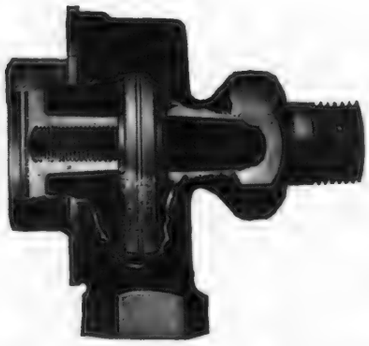
1332

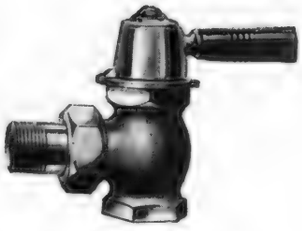
Sterlco
TRADE-MARK

THE STERLCO RADIATOR QUARTET

Complete Radiator and Temperature control for a Vacuum, Vapor or Air Line System may be accomplished through the use of the Regulating Devices shown on this page.

See Bulletins Nos. 36 and 38.





The Sterling Engineering Company
1636-40 Holton Street
Milwaukee Wisconsin

Why not install this new system?

Hot water heating systems don't have to depend on the expansion tank today. A more efficient, more modern system of control does the work of the expansion tank *better—and saves fuel besides.* This is the Mueller Automatic Heat Control System.

Why install anything less satisfactory? The Mueller System can be used on new and old hot water heating plants alike. Hundreds of owners have found it the ideal system for hot water heat control. They like its automatic features. Relief, supply, damper regulation are entirely automatic. It is compact, takes up no valuable space. Entirely safe—and more dependable than the expansion tank. Saves fuel by damper regulation and more rapid circulation of water. Gives more efficient, more even heating.

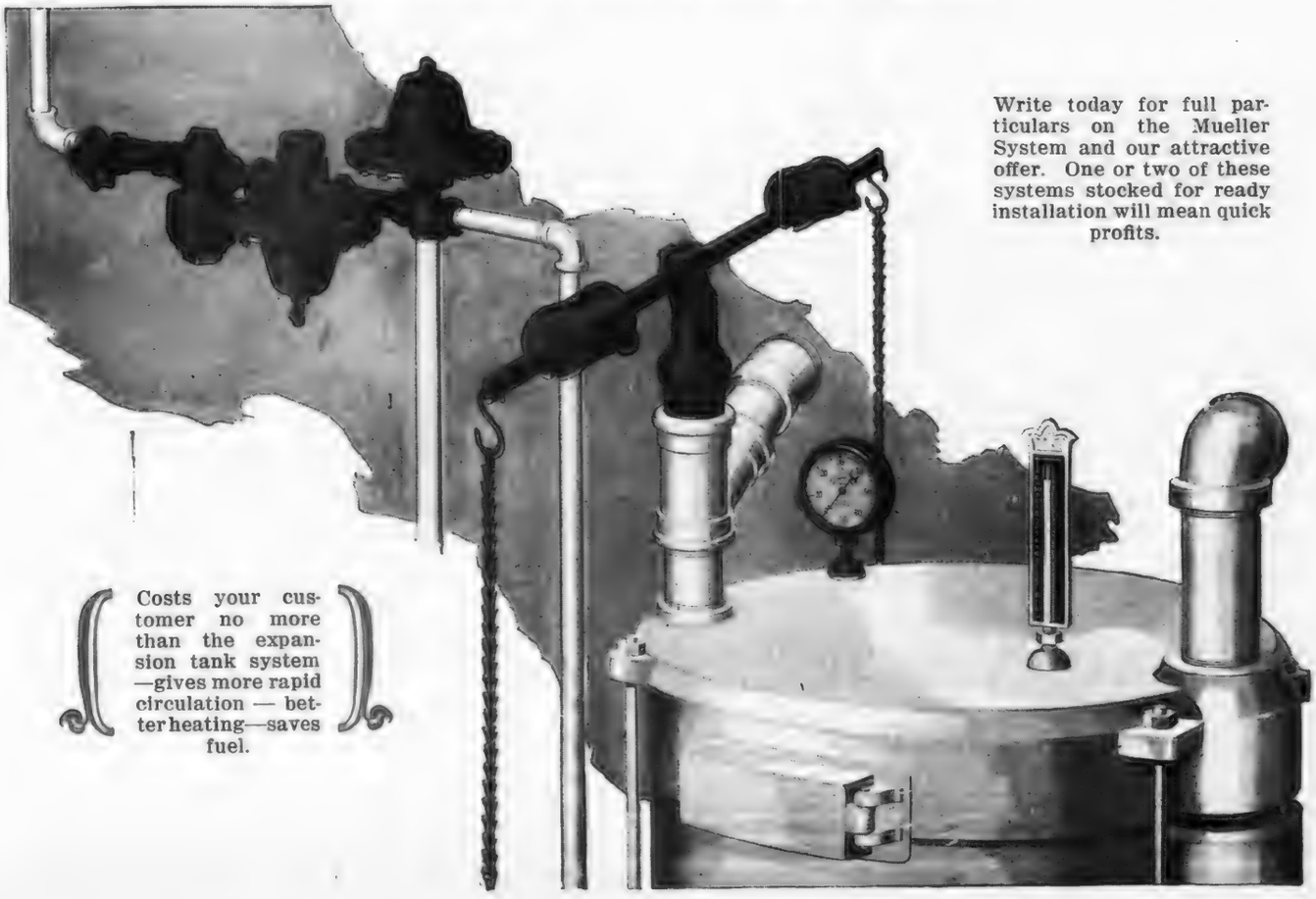
Install this system at one-fourth your usual labor cost. It carries a margin that makes it one of the most attractive heating specialties you could handle.

Make the acquaintance of the Mueller System and it will make friends for you.

MUELLER CO. (*Established 1857*). **Factories: Decatur, Illinois; Port Huron, Michigan.**
Branches: New York, San Francisco, Los Angeles. Canadian Factory: MUELLER, Limited, Sarnia

MUELLER

Automatic Heat Control System



Write today for full particulars on the Mueller System and our attractive offer. One or two of these systems stocked for ready installation will mean quick profits.

Costs your customer no more than the expansion tank system—gives more rapid circulation — better heating—saves fuel.

Sell Fuel Saving—

The Universal Appeal

Regardless of your contact with the house owner, whether you are architect, builder, heating contractor or specialty salesman, there is no path you can take that is as easy as selling "fuel saving."

The *cost of fuel* is the chief obstacle that spoils sales of oil burners and heating equipment.

Fuel cost can be reduced—with any heating system—if you will sell with it a

MINWOOL Furnace Overcoat

Here is an opportunity to sell your customers the finest industrial insulation for home use. Minwool Furnace Overcoat is the domestic installation of MINWOOL — a felted rock wool that is fireproof, non-absorbent and the best practical non-conductor available.

The heat loss through MINWOOL is only one-sixth the loss through asbestos cement and only about half the loss through 85% magnesia.

Ask us for the proof of these statements.

For Hot Water, Steam or Warm Air Furnaces

Better Than Asbestos

Better Than 85% Magnesia

Easy To Apply

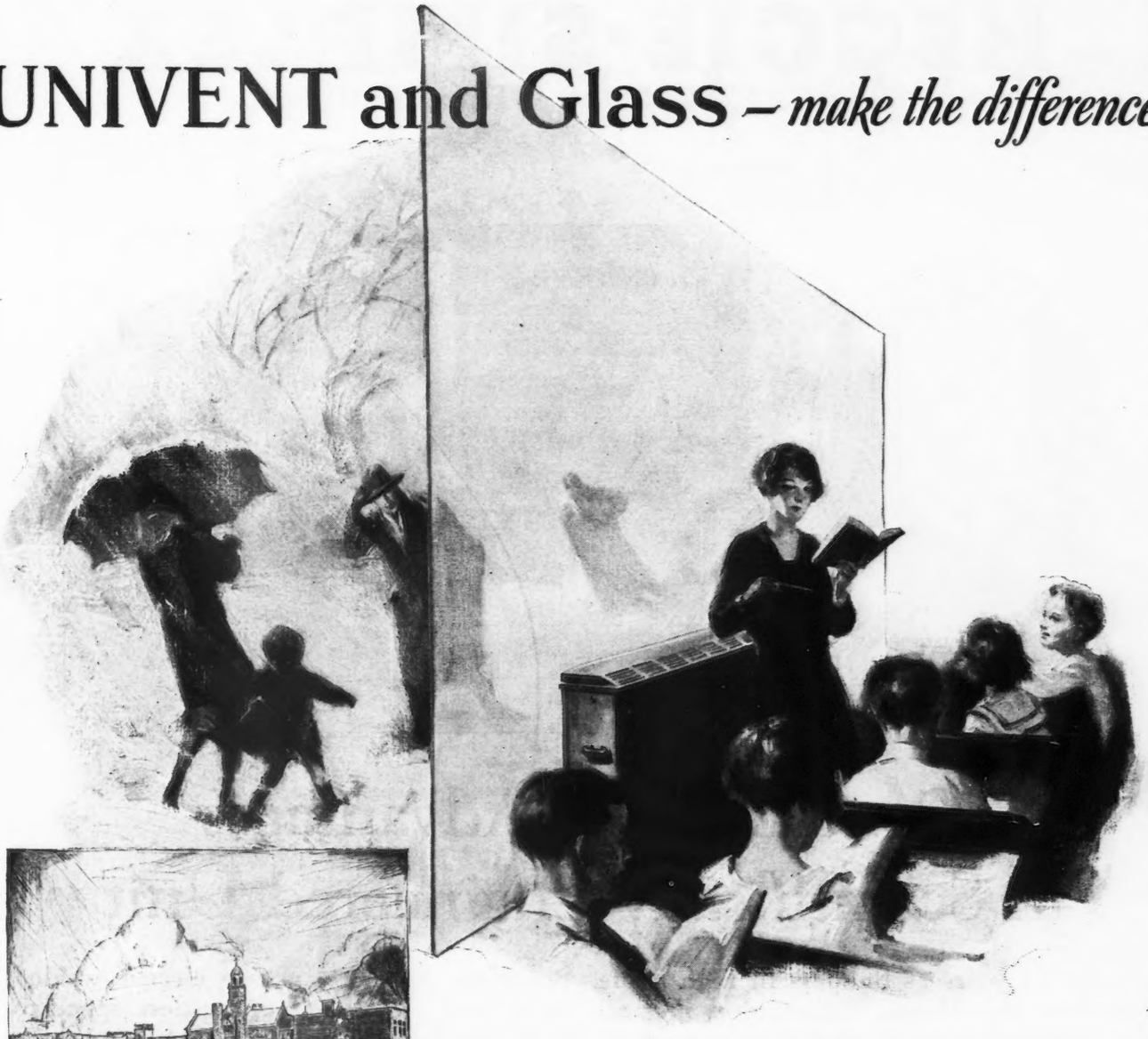
Helps Heat The House Not The Cellar

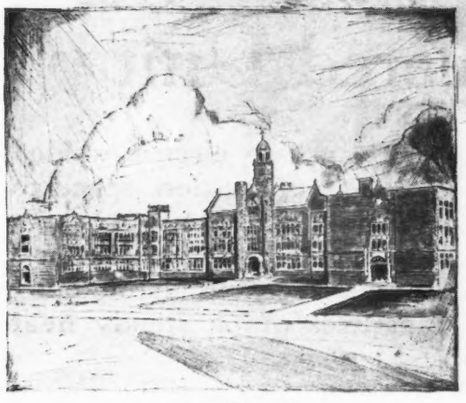
Pays For Itself

THE MINWOOL INSULATING COMPANY

606 Ohio Bldg. TOLEDO, OHIO

UNIVENT and Glass – *make the difference*





Univent Equipped
Cleveland Heights High School, Cleveland, Ohio,
Wallace G. Nesbitt, Director of Schools
Franz C. Warner & W. R. McCornack, Architects,
Mayer & Valentine Engineers
Cleveland, Ohio

UNIVENT
(TRADE MARK)
VENTILATION

FOR the same reason that glass has been used for centuries, to let in the sunlight, independent of the vagaries of the weather, the Univent is used, today, to bring outdoor air directly into the room, without regard to storms, snow, rain, smoke, dust and nerve-wracking outdoor noises.

Univent and Glass make the difference between primitive life, where man must take what nature gives him — and modern life, with the enjoyment of fresh, clean, comfortably warmed outdoor air, within the protecting walls of the schoolroom.

Your pupils and teachers can enjoy air with all its outdoor vigor, every day of every season, in schoolrooms equipped with the Univent. Thousands of schoolrooms know its benefits today, and recognize, in the Univent, the highest and yet the simplest development of Ventilation.

The reasons for their choice are contained, with many other interesting facts, in the book, "Univent Ventilation." Write today, and let us send your copy.

Mfd. only by THE HERMAN NELSON CORPORATION, *Moline, Ill.*

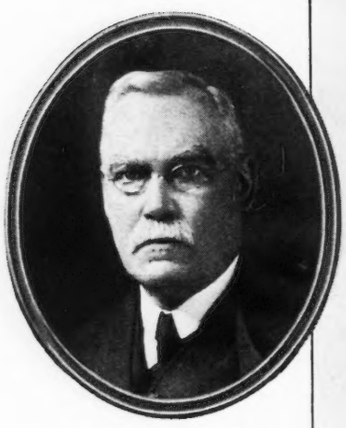
Builders of Successful Heating and Ventilating Equipment for 20 Years

Sales and Service

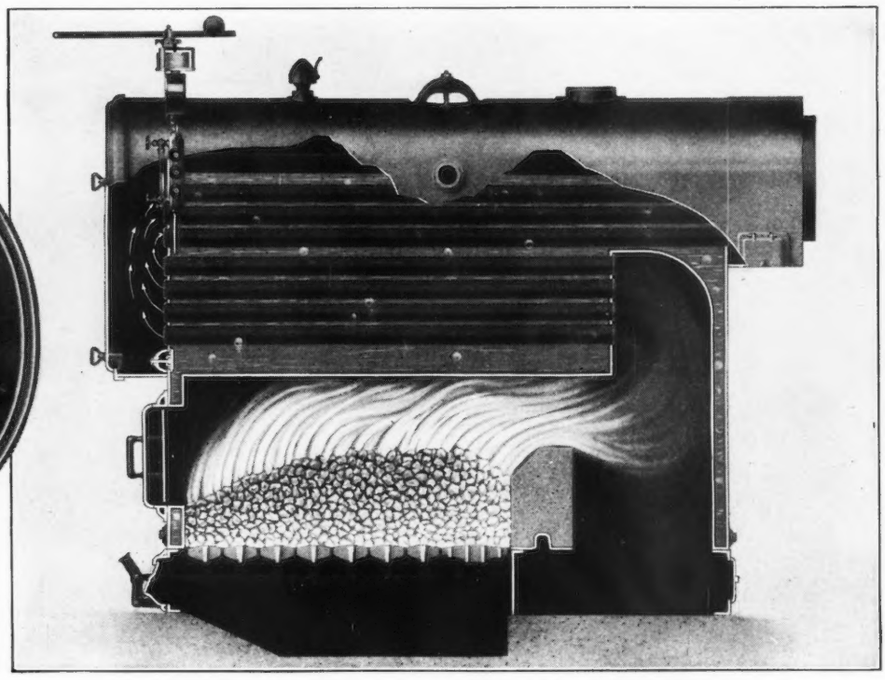
BELFAST, ME.	NEW YORK CITY	PITTSBURGH	COLUMBUS	DES MOINES	SAN FRANCISCO	DENVER	SEATTLE
BOSTON	SYRACUSE	GRAND RAPIDS	TOLEDO	MILWAUKEE	EMPORIA	SALT LAKE CITY	VANCOUVER
NEW HAVEN	PHILADELPHIA	DETROIT	INDIANAPOLIS	MINNEAPOLIS	OMAHA	SPOKANE	TORONTO
	SCRANTON	CLEVELAND	CHICAGO	ST. LOUIS	KANSAS CITY	PORTLAND	

HEGGIE-SIMPLEX

ELECTRIC-WELDED STEEL BOILERS



JAMES G. HEGGIE
who in 1892 founded the Heggie Organization and today is President of the Heggie-Simplex Boiler Co.



Combines All Advantages in Scientifically Engineered Unit

IN its 34 years as builders of high grade boilers, the Heggie organization met all the traditions of boiler designing; as to combustion space, flue travel, heating surface, volume of water, steel *vs.* cast iron, etc.

But in developing the "Heggie-Simplex," these *traditions* were set aside for *facts.* Instead of traditions, the *scientific principles* of heat production and utilization were applied. The advantages and disadvantages of every previous type of heating equipment were considered. By this engineering approach, a boiler was produced which combines in one portable electric-welded steel unit, sufficient combustion space to burn the fuel before the flues are reached, as much as 38% of direct heating surface, long gas travel, and a freely circulating body of water that assures quick steady heat without waste.

In the "Heggie-Simplex", you have—not a boiler based on traditions that involve inefficiency and inconvenience, but a *scientifically engineered unit* in which heat is developed and utilized in the most direct way to secure maximum advantages at least cost.

HEGGIE-SIMPLEX BOILER COMPANY, Joliet, Illinois

Heating Boiler Division of James G. Heggie & Sons, Inc.

Representatives in

Akron	Chicago	Evansville, Ind.
Albany	Cincinnati	Fort Wayne
Albuquerque	Cleveland	Harrisburg
Amarillo	Columbus	Houston
Atlanta	Dallas	Indianapolis
Baltimore	Davenport, Ia.	Jacksonville
Birmingham	Dayton	Joliet
Boston	Daytona Beach	Kan. City, Mo.
Bradenton, Fla.	Denver	La Crosse, Wis.
Bristol, Va.	Des Moines	Lakeland
Buffalo	Detroit	Lima, O.
Casper	Duluth	Little Rock
Charleston, S. C.	Dunedin, Fla.	Louisville
Chattanooga	El Paso	

ELECTRIC-WELDED
HEGGIE-SIMPLEX
STEEL BOILERS

Representatives in

Lubbock	Peoria, Ill.	Springfield, O.
Lynchburg, Va.	Philadelphia	St. Louis
Memphis	Pittsburgh	St. Petersburg
Miami	Racine, Wis.	Syracuse
Milwaukee	Raleigh	Tampa
Minneapolis	Roanoke	Toledo
Nashville	Rochester	Tomahawk, Wis.
New Haven	Rockford	Tulsa
New Orleans	San Antonio	Youngstown, O.
Newport News	Savannah	W. Palm Beach
New York	Scranton	Washington, D.C.
Okla. City	Sebring, Fla.	Waterloo, Ia.
Omaha	Shreveport	Winston-Salem
Orlando	Spartanburg	

Just look up "Heggie-Simplex Boiler Co." in the phone book in any of the above cities for representative's number and address

The Heating and Ventilating Magazine

VOL. XXIII — Reg. U. S. Pat. Off. Reg. Canadian Pat. and Copr't Off. — No. 10

Contents for October, 1926

A Practical Use of the Degree-Day Method of Comparing Heating Costs ..... *Eugene D. Milener* 63

Degree-Days Prove Accurate Unit 64

Unique Cooling and Heating System for Office Buildings ..... *W. E. Kugemann, Jr.* 67
Details of the American Radiator Company Building Installation, Designed by Dr. Brabbee and Looked Upon as an Experiment, on a Practical Scale, with this Type of Equipment.

Home Study Course in Gravity Steam and Water Heating ..... *A. M. Daniels* 73
Lesson No. 20. (Concluded.)—Two-Pipe Steam Heating Systems.

Perfumed Ventilation for the Modern Hospital 75

Fundamental Factors in District Steam Distribution 76
Working Out a Specific Problem—Effect of High-Pressure Feeders and of Variations in Initial Pressure on Distribution System Costs.

Ventilating the World's Largest Sub-Aqueous Tunnel 80

A Commercial Research Laboratory for Heating and Ventilating 83

Radio Talks on Heating ..... *R. C. Rosenbach* 88

Data on Welded Pipe Flanges 89
Methods of Making Reliable Joints Between Heavy Plate Flanges and Pipe Walls, Thin in Comparison.

Legal Decisions 90
Compliance with Guarantee of Heating Systems.
Heating Contractors' Lien for Drayage of Materials and Commissions on Costs.
Ownership of Heating Plant Equipment Brought to Building but Never Installed.
Heating Contractor's Lien Held Not That of Material Man.
Timely Filing of Mechanics' Lien for Ventilating Installations.
Amendment of Lien Notice to Show State of Completion of Contract—Work Performed at Intervals.
Liability of City for Public School Heating Systems.
Covenant to Heat Apartment Houses.
No Proof of Improper Placement of Radiators and Connections.
Meaning of "Good Heating Service" in Warranty.

Correspondence 92
Proper Connections for the Round Type of Boiler.
Too Large an Opening Makes the Fireplace Smoke.
Chimney Fires—Cause and Prevention.
Base Temperatures for Figuring Radiation.
Why Omit the Name of the Engineer Under Illustrations of Buildings?

New York University Course in Heating and Ventilating Engineering 95

Difficulties in Obtaining a Standard Oil-Burner Ordinance 96

Present Practice in Vapor Heating 99
The Mouat System.

American Society of Heating and Ventilating Engineers 100
Open-House Day of Research Laboratory.
Society Nominees for 1926-1927.
New York Chapter Members Guests of the Nash Engineering Company.
Society Represented on National Committee to Codify Garage Ventilation and Heating Standards.

National Tube Announces New Standard Pipe Sizes 101

National Demonstration House Campaign 102

Golden Anniversary for President Baker of Kewanee Boiler Company 103

Insulation Chart to Prevent Condensation and Heat Loss 104

Easy Money Schemes that Mulct Business Men 105

How to Operate an Oil Burner ..... *W. H. Walterskirchen and C. E. Bronson* 113

In the Small-Coal Burning Grate Field 113
1. Neemes Improved Shaking and Dumping Grate.

Present Accepted Practice in Domestic Oil Burning 115
23. Safe Fire.

Standard Heating and Ventilating Data Sheets 98A
No. 13S2—Radiation Computing—H. & P. C. N. A. Standard Radiation Estimating Table for Cleveland.
No. 13T2—Radiation Computing—H. & P. C. N. A. Standard Radiation Estimating Table for Portland, Ore.

Engineers' Specification Index, Page 176

Advertisers' Index, Page 186

YEARLY SUBSCRIPTION $2.00 — **SINGLE COPIES, 30 CENTS**

Published monthly at 1123 Broadway, New York, by the Heating and Ventilating Magazine Co.

Entered as second-class matter, April 18, 1925, at the Post-Office at New York, N. Y., under the Act of March 3, 1879.

Copyright, 1926, by Heating and Ventilating Magazine Co.

C. HOWARD CRANE,
Architect, Detroit, Mich.

J. UPTON GRIBBEN,
Resident Architect,
Columbus

THE HUFFMAN-WOLFE COMPANY,
Heating and Plumbing Contractors, Columbus

MR. RAY S. WILDE,
Consulting Engineer, Detroit, Mich. Designer of the heating, plumbing and power equipment.

AMERICAN INSURANCE UNION CITADEL, now under construction, Columbus, Ohio: owned by American Insurance Union: will be tallest building outside of New York, fifth tallest in the world.

Will consist of The Deshler Hotel — basement to 18th floor, inclusive: and offices from the 19th to the 39th floors, both inclusive, with the remaining 13 floors devoted to machinery rooms, observation towers and smoke-stack. Rear of hotel, and attached to the building, will be the new Keith-Albee Theatre.

The 555½ foot—52 story

AMERICAN INSURANCE UNION CITADEL

Includes

JOHNSON DUAL THERMOSTAT TEMPERATURE REGULATION

Again automatic temperature regulation receives convincing endorsement, and The Johnson DUAL SYSTEM again is given preference — with one of the most impressive and significant installations ever made: this hotel, theatre, office building.

Johnson Temperature Control, with Ventilation Equipment, is specified for the 18 floor hotel portion complete — including lobbies, foyers, dining rooms; and the huge, new Keith-Albee Theatre adjoining,

Johnson System of DUAL THERMOSTAT Temperature Regulation is specified for the offices — 19th to 39th floor — in *two groups:* one exclusively for the offices used by the American Insurance Union, one for the separate offices of the building's tenants.

Each of these two groups of thermostats will be operated by pneumatic clocks; which automatically will turn the system of control from day to night condition in vacated rooms at the end of day, and back again, automatically by the clock, and as specified by the building's or offices' management. In rooms used during the evening, day time normal temperature will remain until twelve-thirty midnight; when the temperature will be turned to night condition by the same clock, and, as above, restored to day time normal again next morning. Obviously, enormous fuel saving effective heat regulation night and day. And the entire installation is so arranged that future partitions can be erected on the floors of the building without necessitating any cutting or patching to install thermostats for future use.

Include Johnson Dual Thermostat Control in your buildings: present and future. Full detail particulars furnished on request.

JOHNSON SERVICE COMPANY

Main Office & Factory: Milwaukee, Wisconsin, U. S. A.

Automatic Temperature Regulation Since 1885. The All-Metal System. The Dual Thermostat System.

Twenty-nine Branches: United States and Canada.